Peer-led walking programme to increase physical activity in inactive 60- to 70-year-olds: Walk with Me pilot RCT.

Title

Peer-led walking programme to increase physical activity in inactive older adults: 'Walk with Me' pilot RCT

Keywords

Physical activity; Walking, Pedometer, Peer Mentor, Older Adults, Feasibility Study, Pilot RCT

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Abstract

Background: Levels of physical activity decline with age. Some of the most disadvantaged individuals in society, such as those with lower rather than higher socio-economic position, are also the most inactive. Peer-led physical activity interventions may offer a model to increase physical activity in these older adults and thus help reduce associated health inequalities. This study aims to develop and test the feasibility of a peer-led, multicomponent physical activity intervention in socio-economically disadvantaged community dwelling older adults.

Objectives: The study aimed to develop a peer-led intervention through a rapid review of previous peer-led interventions and interviews with members of the target population. A proposed protocol to evaluate its effectiveness was tested in a pilot randomised controlled trial (RCT).

Design: A rapid review of literature and pilot study informed the intervention design; a pilot RCT included a process evaluation of intervention delivery.

Setting: Socio-economically disadvantaged communities in the South Eastern and Northern Health and Social Care Trusts in Northern Ireland.

Participants: Fifty adults aged 60-70 years, with low levels of physical activity, living in socio-economically disadvantaged communities, recruited though community organisations and general practices.

Interventions: 'Walk with Me' is a 12-week peer-led walking intervention based on social cognitive theory. Participants met weekly with peer mentors. During the initial period (weeks

1-4), each intervention group participant wore a pedometer and set weekly step goals with their mentor's support. During weeks 5-8) participants and mentors met regularly to walk and discuss step goals and barriers to increasing physical activity. In the final phase (weeks 9-12), participants and mentors continued to set step goals and planned activities to maintain their activity levels beyond the intervention period. The control group received only an information booklet on active ageing.

Main outcome measures: Recruitment and retention rates and completeness of the primary outcome (moderate and vigorous intensity physical activity measured using Actigraph GT3X+ accelerometer at baseline, 12 weeks (post-intervention) and 6 months; acceptability assessed through interviews with participants and mentors.

Results: Of the planned 60 participants, 50 eligible individuals participated; 66% (33/50) were female; 60% (40/50) were recruited from general practices. At six months, 86% (43/50) attended for review; 93% (40/43) of these returned valid accelerometer data. Intervention fidelity was assessed by using weekly step diaries, which were completed by both mentors and participants for all 12 weeks, and checklists for the level of delivery of intervention components, which was high for the first three weeks (range 49% to 83%) but the rate of return of checklists by both mentors and participants diminished thereafter. Outcome data indicate that a sample size of 214 is required for a definitive trial.

Future work and limitations: The sample was predominantly female and somewhat active. Future research needs to identify methods to recruit males and less active older adults into physical activity interventions.

Conclusions: The 'Walk with Me' intervention is acceptable to a socio-economically disadvantaged community of older adults and a definitive RCT to evaluate its effectiveness is feasible. Some modifications are required to ensure fidelity of intervention delivery is optimised.

Study Registration: Current Controlled Trials ISRCTN23051918

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Supplementary Material 2: Interview Schedules regarding recruitment to the 'Walk with Me' Intervention

List of Abbreviations

BCTs	Behaviour Change Techniques
BMI	Body Mass Index
EPAQ	EPIC Physical Activity Questionnaire
EQ-5D	EuroQol 5 dimensions
GHQ	General Health Questionnaire
GP	General Practitioner
I-MIC	Integrated Model to Design Intervention Content
LSN	Lubben Social Network
MVPA	Moderate and Vigorous Physical Activity
NIMDM	Northern Ireland Multiple Deprivation Measure
ORECNI	Office for Research Ethics Committees Northern Ireland
RCT	Randomised Controlled Trial
SF-12	Short-Form 12
SCT	Social Cognitive Theory
SD	Standard Deviation
SEHSCT	South Eastern Health and Social Care Trust
UK	United Kingdom
WEMWBS	Warwick-Edinburgh Mental Well-being Scale

Plain English Summary

Many older people would benefit from taking more regular physical activity, especially those living in areas of socio-economic disadvantage. Interventions delivered by trained members of the public who are from a similar background and of a similar age have shown promise at increasing people's physical activity levels in previous research. These individuals are known as peer mentors. This study aimed firstly to develop an intervention, to be delivered by peers, to enable older adults to become more active. The practicality of delivering and evaluating this intervention was then tested in a trial.

The 'Walk with Me' intervention was developed using guidance from previous successful interventions and with input from older adults. Interviews with older people from socio-economically disadvantaged communities indicated that many lived busy lives and felt that having a peer mentor to walk with would help them become more active, but that the intervention should be tailored to individuals' abilities using personalised physical activity goals, such as daily step goals.

Fifty individuals aged 60 to 70 years agreed to take part. Half were allocated by chance to a 12-week walking intervention and half to a control group who received an information booklet on how to become active. The intervention group monitored their daily steps using a pedometer. These individuals met with a peer mentor to set walking goals and take part in physical activity in their local community. After six months, most participants (93%) were still in the study and returned information. Participants rated the intervention favourably in in-depth interviews and reported increasing their activity, but the study was not large enough to show if this was a real change. The study showed that it would be possible to conduct a study to definitively test if a walking intervention delivered by peer mentors can increase older adults' physical activity.

Word count: 300/300

Scientific Summary

Background

Physical activity is associated with a reduced risk of developing a range of chronic non-communicable diseases and with improved mental health in older adults. In addition, lower levels of physical activity are associated with poorer social health, such as increased social isolation and loneliness. Physical activity levels also decline with age. The percentage of the population that is 65 years or older is growing, which is associated with rising healthcare costs attributed to the associated increased prevalence of morbidity, disability and mortality, especially among older adults from socio-economically disadvantaged backgrounds. This suggests there is a need to develop effective interventions that promote active ageing.

Previous physical activity interventions for older adults have been effective, but many do not include the types of individuals who would benefit the most, such as low active groups and those living in socio-economically disadvantaged communities. Peer-led interventions are becoming increasingly common as they are relatively cheap and have been shown to be an effective way of encouraging behaviour change, including physical activity. Peer mentors are trained, nonprofessional individuals, who are similar to the target population (e.g., age and cultural background) and possess experiential knowledge of the target behaviour. However, there is a lack of research of the effectiveness of peer-led physical activity interventions for older adults living in socio-economically disadvantaged communities.

The aim of the study was to bridge the evidence gap by developing and testing the feasibility of delivering and evaluating a complex peer-led, multi-component physical activity intervention, derived from a socio-ecological model of health, in socio-economically disadvantaged community dwelling older adults.

Objectives

The objectives of the study were to:

1. determine the most efficient methods of recruitment to a peer-led physical activity intervention in older adults.
2. assess the resources needed for the development of a future definitive trial.

3. assess the feasibility of a RCT of a peer-led walking intervention in older adults in terms of rates of recruitment, retention and data completeness, the administration of outcomes and the acceptability of the intervention.
4. generate data to inform what sample size would be required in a definitive trial of a multilevel peer-led physical activity intervention, based on the variability in objective measurements of physical activity and recruitment and attrition rates.
5. measure the resource use associated with the intervention and estimate costs.
6. pilot the use of a health and social care service use instrument and summarise the resource use and costs per group.

Methods

Design: using behaviour change techniques identified from a rapid review of previous interventions and semi-structured interviews, a peer-led physical activity intervention was developed. A two-arm pilot RCT was conducted.

Physically inactive individuals, according to the General Practice Physical Activity Questionnaire aged 60-70 years, living in socio-economically disadvantaged communities in the South-Eastern and Northern Health and Social Care Trusts in Northern Ireland, were recruited through general practices and community organisations. Individuals who self-reported a recent history (within the last six months) of myocardial infarction or stroke, or physical limitations that would limit ability to participate in a walking programme were excluded.

'Walk with Me' Intervention: Following the collection of baseline outcomes, individuals were randomised to either an intervention or control group using computer generated random numbers. The 12-week intervention was based on social cognitive theory and was comprised of three stages. Stage one (weeks 1-4) involved getting to know the peer mentor and setting initial pedometer step goals. Stage two comprised of setting short- and long-term physical activity goals and problem solving (weeks 5-8). Finally, stage three emphasised behaviour rehearsal and practice by walking regularly in a locally accessible physical activity environment and signposting participants to other activity programmes in their community to encourage them to maintain their activity (weeks 9-12). The intervention was delivered by trained volunteer peer mentors. Participants in the control group received an information

booklet on active ageing. They did not receive any additional support to change their activity over the course of the research study.

Main outcome measures: Outcomes were assessed at baseline, post-intervention (12 weeks) and six months after baseline. The primary outcome was minutes of moderate and vigorous physical activity measured using an Actigraph GT3X+ accelerometer, worn for 7 days. In addition, physical and mental health and mental wellbeing were assessed using the Short-Form 12 Health Questionnaire and the Warwick-Edinburgh Mental Well-being Scale. Health-related quality of life was assessed using the EuroQol-5D-5L questionnaire. Social engagement was measured with the UCLA Loneliness Scale and the Lubben Social Network Scale. Physical activity and social activity self-efficacy, and physical activity and social activity outcome expectancies were also measured. Participants recorded their use of health care using a health and social care services resource use log, in order to pilot the use of the tool for a future definitive trial. The resource use associated with the planning, preparation and delivery of the intervention was collected prospectively.

Assessment of Feasibility: The feasibility of conducting a definitive trial was assessed as the ability to recruit participants and retain them in the study. The recruitment rate was assessed by calculating the total number recruited as a proportion of the pre-defined target of 60 participants, within the timeframe of the study. Attrition was measured as the proportion of participants that did not complete outcome measures at 6 months after baseline. Pre-determined thresholds of 60% and 30% were set for recruitment and retention rates to assess the feasibility of conducting a definitive trial. In addition, the completeness of return of the primary outcome, unexplained adverse events and the views of participants and peer mentors were taken into account.

Results

Recruitment and retention: In total, 50 individuals were deemed eligible and entered the study. Therefore, 82% of the target sample size was recruited. At the end of the 12-week intervention period, seven participants had dropped out of the study. No further participants dropped out at six months, resulting in a retention rate at 12 weeks of 86% (43/50).

Participant Characteristics: Of the 50 participants, 24 were allocated to the intervention group and 26 were allocated to the control group. At baseline, the groups were similar in terms of activity levels and health status. The overall mean age of participants was 64.5 years. Participants were predominantly female (overall 66%).

Data completeness: At baseline, 48/50 (96%) of participants returned valid accelerometer data. The return of valid accelerometer data was similar at six months (40/43; 93%). Other outcomes were returned with a similar degree of completeness.

Change in outcomes: The study was not powered to assess effectiveness, therefore only descriptive statistics have been reported. There did appear to be an increase in moderate-to-vigorous physical activity at 12 weeks and 6 months in the intervention group (7.42±10.79 mins/day & 6.31±16.60 mins/day respectively), but a decrease in the control group (-8.02±24.41 mins/day) at 12 weeks and slight increase at 6 months (1.51±29.54 mins/day). One control group participant returned to work as a postman during the study. If his data are excluded from the analysis, the change in the control group at six months was -4.33±16.55 minutes of MVPA per day, resulting in a difference of differences between the groups of 10.64 mins of MVPA per day.

Mixed findings were found for other outcomes, with a high degree of variability. No adverse events related to the study were reported by participants.

Intervention Fidelity: Intervention fidelity was assessed through the use of weekly step diaries and checklists whereby both participants and mentors recorded the delivery of intervention components. All peer mentors (n=13) and 12 intervention participants returned data. Weekly step diaries were fully completed by both mentors and participants, for all 12 weeks. The fidelity checklists were not completed to the same extent. For the first three weeks, mentors and participants reported a high rate of delivery for intervention components (range 49% to 83%). From week six onwards, the rate of return of forms diminished.

Acceptability: Participants in the intervention reported very high rates of satisfaction with the intervention and the helpfulness of their peer mentor. They noted that the intervention was useful in establishing a physically active routine and that they were still active with their peer

mentor even after the end of the programme. Some participants suggested that it may be helpful to add a walking group to the intervention and that they disliked having to complete so much paperwork.

Assessment of intervention costs: The total cost to deliver the intervention was £5055 and the mean cost per participant was £211. The main driver of costs was the trainer time input to peer mentor training and supervision.

Assessment of health service use and associated costs: Health service use was low for both groups, but total costs were lower (£68) in the intervention group. Feedback was generally positive for the health service use log, however some changes are required.

Changes for a definitive study

1. Participants were somewhat active and healthy, and more likely to be female. Recruitment methods need tailoring to recruit very inactive, less healthy individuals and males to a definitive trial.
2. Using GP practices to recruit participants is becoming increasingly complex, and we have identified a variety of approaches that can be used, including synchronising recruitment efforts with other activities in the practice, such as clinics and media outputs.
3. Participants in the control group expressed a desire for more than just a waitlist condition. Future peer-led interventions could consider using an attention matched control group, offering nutrition advice as well as physical activity.
4. The 'Walk with Me' intervention only included individuals aged 60-70 years. Feedback was received that inclusion criteria should be based on ability, without an upper age limit. We would therefore remove the upper age limit of both participants and peer mentors in a future definitive study.
5. The volume of self-reported outcomes needs to be reduced in order to reduce participant burden. This includes limiting the outcome measures to a single general health measure and removing the physical activity questionnaire. In addition, greater efforts will be required to encourage the return of data from those who discontinue the intervention but do not withdraw from the study, including the offer of telephone interviews to collect outcome data.

6. As participants expected to receive a heath check as part of the intervention we propose adding measures of blood pressure and body mass index.
7. To address the reported decline in fidelity of intervention delivery during the later stages of the intervention, during the ongoing support offered to mentors, emphasis should be placed on the importance of following the approach to goal setting as described in the programme manual and of recording the delivery of intervention components.
8. The exclusion criteria need to be widened to exclude those not in work at the start of the intervention but planning a return to work before the end of follow-up, to avoid the possibility of introducing bias in measured outcomes due to increased work-related physical activity.
9. The peer mentor training needs expanded to include a top-up training session half way through the intervention to reinforce the importance of taking a flexible approach with participants in terms of the timing and venue of meetings.

Conclusions

There is a lack of evidence of the effects of peer led walking programmes in older adults. The 'Walk with Me' intervention was acceptable to participants. A need to reduce the burden of self-reported outcomes and to address intervention fidelity in the later stages of the intervention was identified. Quantitative and qualitative information suggested that it would be feasible and worthwhile to conduct a definitive trial.

Trial Registration

Current Controlled Trials ISRCTN23051918

Funding

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Chapter 1: Introduction

Ageing and physical activity

Many countries, including the United Kingdom (UK), are facing rapid growths in the proportion of the population aged 65 years or older.[1] Within the UK, Northern Ireland is projected to have the most rapid increase in the age of its population, with approximately 25 percent of the population projected to be aged 65 and over by 2041.[2] Ageing is associated with functional decline, reduced quality of life and increased risk of morbidity, disability and mortality.[3] Payette et al[3] have called for a renewed focus on the prevention of multi-morbidity, which is set to double in the next twenty years. In addition, health problems emerge at a younger age in older adults from socio-economically disadvantaged backgrounds, indicating the need for interventions targeting these individuals.[4]

Physically active older adults are at a reduced risk of developing numerous chronic non-communicable diseases,[5, 6] all-cause mortality,[7] poor self-rated health,[8] risk of falls,[9, 10] and sarcopenia.[11] In addition to the physical health benefits, regular activity has been associated with improved cognitive function and reduced risk of dementia[12] and higher levels of health-related quality of life.[13] These associated physical and mental health benefits may lead to lower utilisation and cost of healthcare services.[14] In addition, lower levels of physical activity are associated with poorer social health, such as increased social isolation (fewer number of interactions with others) and loneliness (feeling of being alone), in adults aged over 65.[15, 16]

Physical activity levels of older adults in the UK

In the UK, it is recommended that older adults undertake at least 150 minutes of moderate intensity physical activity per week.[17] Despite the possible benefits of being physically active, levels of inactivity increase with age. Two thirds of adults aged over 65 years are not meeting recommended levels, with significant inequalities in participation rates in people from socio-economically disadvantaged areas.[18] Declining physical activity levels are a major public health concern in the UK due to the associated healthcare costs, estimated to be £0.9 billion per year.[19] Coupled with the anticipated rise in the number of older adults in the UK and half of current lifetime spending on healthcare being accounted for in old age,[17] there is a need to develop effective interventions that promote active ageing.

Physical activity interventions for older adults

Systematic reviews of physical activity interventions for community-dwelling older adults[20-23] have demonstrated that medium term (up to one year) effects on physical activity are achievable with interventions that have encouraged older adults to perform some type of aerobic activity, of which walking was the predominant form. These reviews also highlight that many of the included interventions do not reach the people who would benefit the most.[21, 22] There is therefore a need to develop interventions that specifically target groups who participate in low levels of physical activity, such as those from socio-economically disadvantaged communities. These 'hard to reach' groups have their own unique needs that should be considered in designing an intervention.

The barriers and motivators for physical activity reported by older adults are different from those in younger people. For older people, poor health and a lack of knowledge of, and belief in the health benefits of physical activity are most frequently cited as the major barriers to regular participation.[24] Inactive older adults have identified their preference for individually tailored physical activity programmes, which take place outside of intimidating settings such as gyms and which avoid the concern of slowing others down in group exercise.[25] Devereux-Fitzgerald et al[26] recently reviewed the experience of older adults in previous physical activity interventions. Older adults' doubts about their physical capability or their need to engage in moderate intensity physical activity in later life were addressed through their experience of participation in the physical activity interventions.[26] Devereux-Fitzgerald et al[26] also identified that older adults cited their enjoyment of social interaction with others in the intervention as a motivation to be physically active.

In addition to addressing individual and social determinants in physical activity interventions, research has demonstrated the influence of neighbourhood environments to support physical activity in older adults. Living in an area that is supportive of physical activity (i.e. more 'walkable') has been associated with higher levels of physical activity, especially in individuals who also had higher self-efficacy and social support.[27] Although not feasible to introduce wide-scale changes in the physical environment within behavioural interventions, previous research has shown the potential of physical activity interventions which seek to encourage the use of existing infrastructure for older adults'.[28] Therefore interventions

designed on the basis of the socio-ecological model that seeks to address multiple levels of influence on physical activity behaviours (including individual, social and environmental factors), may have the potential to deliver sustained changes in physical activity. However, there are few interventions designed to address these multiple influences in community dwelling older adults.

Peer-led physical activity interventions

Peer-led interventions offer a model that may help older adults overcome many of the barriers to physical activity. Peer-led behaviour change interventions are a common and effective means of encouraging behaviour change, including physical activity.[29, 30] Peer mentors are trained, nonprofessional individuals, who are similar to the target population (e.g., age and cultural background) and possess experiential knowledge of the target behaviour.[31, 32] Peer mentors offer emotional support, motivation through positive reinforcement, and relevant knowledge regarding problem solving strategies.[33]

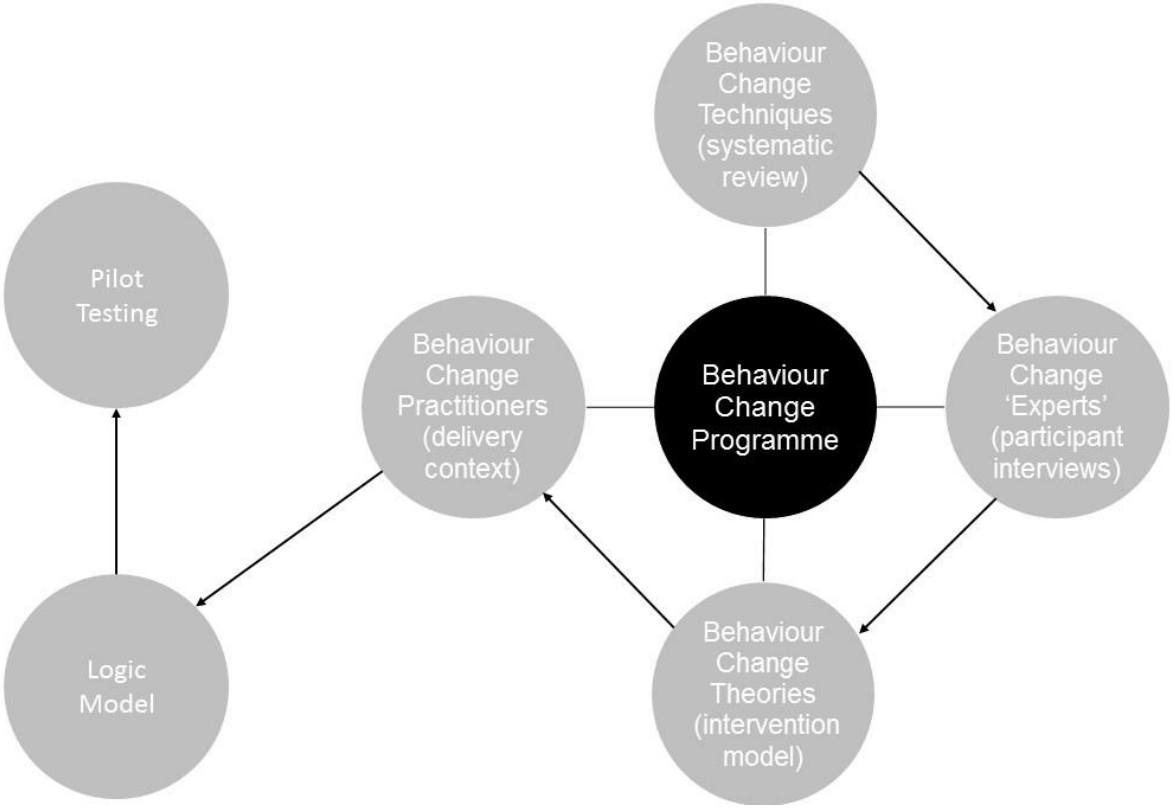
In previous interventions, peer mentors have delivered skills training, provided advice and feedback, and offered social support.[32] The 'motivational' peer mentor is therefore an important source of social influence in interventions, addressing behavioural determinants such as self-efficacy, perceived competency to be active, and self-determination.[32] However most previous peer-led physical activity interventions have not employed a theoretical framework in their design phase, making it difficult to understand the potential mechanisms through which these interventions may work.[32]

Aims of the 'Walk with Me' Project

Using the MRC framework for complex interventions,[34] we designed and tested the feasibility of a multilevel peer-led physical activity intervention for older adults, tailored to meet the needs of the local community. The intervention package was developed after identifying appropriate behaviour change techniques (BCTs) through a rapid review of previous peer-led interventions. Following this, we conducted interviews with members of the target population to explore their preferences for, and their perceptions of the feasibility of, the BCTs identified in the rapid review. Using information from the first two stages, combined with behaviour change theory (social cognitive theory) and input from practitioners regarding the context for the delivery of the proposed programme, we developed a peer-led

physical activity intervention and logic model, and tested its feasibility (*see Figure 1*) in a pilot randomised controlled trial. The aim of the pilot trial was to provide information on recruitment and attrition rates, intervention fidelity, data on the variability in objective physical activity measurements and the resources needed to support the development of a definitive trial.[35]

Figure 1: Integrated Model to Design Intervention Content (I-MIC)



Changes to the intervention delivery

It was originally planned that peer mentors would be managed under the existing walking group scheme in the Health and Social Care Trust. Due to governance issues, it was not possible to arrange this in a timely manner, so the 'Walk with Me' study protocol needed to be amended. Therefore, some of the peer mentors were also insured and indemnified through Queen's University Belfast.

Chapter 2: Rapid Review to Identify Components used in Previous Peer-Led Interventions

Introduction

The first phase in the MRC complex intervention model is to gather relevant evidence and theory in order to develop a logic model for the implementation of the intervention, which includes the proposed causal pathways and relevant outcome measures. A rapid review approach[36] was used to gather evidence and review the behaviour change techniques (BCTs) employed in previous peer-led physical activity interventions in adults aged over 18 years.

Peer-led interventions can be considered complex, as they involve multiple interacting BCTs.[34] This makes it difficult to identify the most effective techniques used within peer-led interventions to encourage physical activity behaviour change.[37] To standardise the extraction of components employed in previous interventions, Michie et al[37] developed the BCT Taxonomy v1. This taxonomy provides standardised labels and definitions for 93 BCTs hierarchically organised in 16 groupings. BCTs are "an observable, replicable, and irreducible component of an intervention, designed to alter or redirect causal processes that regulate behaviour".[37] Previous evidence demonstrated an association between identification of BCTs and effective interventions for physical activity behaviour change.[38] Presently, there are no published studies identifying which BCTs are most widely used for physical activity behaviour change in peer-led interventions in older adults (>60 years). The aim of our rapid review was to identify the BCTs employed in previous peer-led physical activity interventions.

Methods

Protocol registration

The review protocol was registered and published at PROSPERO: (htttp://www.crd.york.ac.uk/prospero/). Registration No CRD42014009791

Identification of studies

The following seven databases were searched from inception until March 2015: MEDLINE, EMBASE, SPORTDiscus, Cochrane Library, Physical Education Index and Web of Science. They were searched using a tailored and sensitive search strategy. Physical activity terms were based upon those used in a previous Cochrane review of interventions to promote physical activity.[39] These were combined with peer-led intervention search terms derived from a previous review of peer-led interventions.[29] The search strategy was developed for Medline, and adapted for the other databases. A full list of terms is included in Appendix 1. In addition to searching electronic databases, the reference lists of included studies and relevant systematic reviews were searched for appropriate studies.

Inclusion criteria

The review was not restricted to interventions only targeting older adults as we anticipated there would be very few peer-led interventions in this age group, and this might limit the inclusion of potentially useful components. Therefore, studies involving community dwelling adults (>18 years) were included. Interventions targeting changes in physical activity, and those that reported change in physical activity were included. Studies needed to include a control or comparison group to be included. No language restrictions were applied.

Study selection

All duplicate studies were removed with RefWorks software (ProQuest, Michigan, USA). Two reviewers (ALW and MAT) independently screened the title and abstract of all remaining references to remove those that were obviously not relevant. The full text of remaining articles was obtained and screened for inclusion. When any discrepancies arose, consensus was reached through discussion with other authors.

Data extraction and management

The Cochrane Public Health Group data form was modified to meet the requirements of this review. The form was piloted by two authors (ALW) and (MAT) in a random sample of three studies to confirm that it captured relevant data. Data extracted included method of recruitment, type of peer who delivered the intervention, theoretical basis of intervention components, timing of intervention (frequency, intensity, duration) and method of delivery of outcome assessment.

Assessment of risk of bias in included studies

The risk of bias in the included studies was examined using the Cochrane Risk of Bias Assessment Tool (Cochrane Collaboration, 2014). This tool was extended to include risk of bias in specific assessments relating to physical activity interventions (e.g. use of objective measure of physical activity as an outcome measure). Two authors (ALW) and (MAT) independently assessed each study's risk of bias. All discrepancies were resolved by the reviewers through discussion.

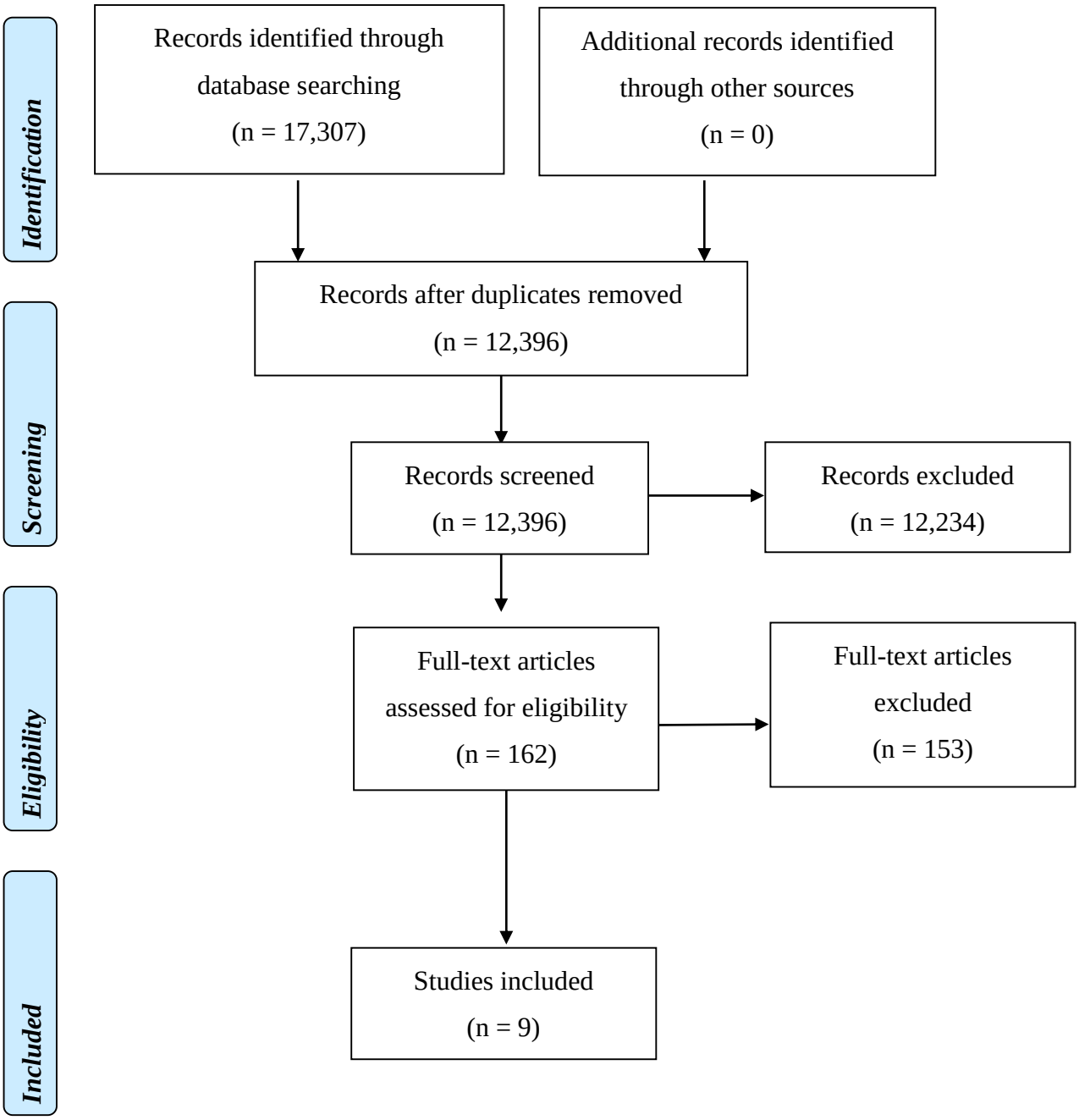
Identification of BCTs

Two trained reviewers (AW & CC) extracted information of the BCTs in included interventions. A detailed data extraction form was developed by three reviewers (MAT, CC and AW) (*see Appendix 2*). BCTs were extracted independently by two of the three reviewers (AW and CC) using the published BCT Taxonomy v1.[37] Discrepancies were resolved through discussion with a third reviewer (MAT).

Results

Overall, a total of 17,307 citations were identified from the database searches (*see Figure 2*). After the removal of duplicates, 12,396 citations remained. After title and abstract screening, 162 full text articles were assessed for inclusion. Most excluded studies did not measure free living physical activity or were single arm intervention studies with no control group (*see Figure 2*).

Figure 2: PRISMA Flow Diagram for Rapid Review



Characteristics of included studies

Nine studies (1,780 participants with mean age 54.8 years) met the inclusion criteria and were included within this review.[40-48] Table 1 summarises in detail the key characteristics of included studies. Six of the nine studies were randomised controlled trials.[40-42,45,47-48] Two of these studies were conducted in patients: male first time cardiac surgery patients[44] and

females with stage 0-3-breast cancer.[43] Most interventions were implemented in the USA (n=5),[40-41,43-44,48] others in Canada (n=2),[45-46] UK (n=1)[47] and Hong Kong (n=1).[42] Overall, 69% of participants were female. Five of the nine studies involved more than 70% female participants.[40,43-46,48] One study involved exclusively female participants[44] and one involved exclusively male participants.[45] In all studies, the authors reported they had no conflict of interest to declare.

Table 1: Characteristics of Included Studies Aimed at Increasing Physical Activity in Children, Adolescents, Adults and Older Adults

Study	**Sample Population**	**Age Mean (±SD)**	**Target Population**	**Setting**	**Country**	**Sample Size (number allocated)**	**Study Design**
Boyle[40]	Students (>18 years) enrolled in a personal health class during the 2007-2008 academic year.	Total Sample Range: 21 years (21.1 ± 4.47) Intervention (21.2 ± 4.28) Control (21.1 ± 4.67)	Female (74%) Ethnicity White (91%) Full-time students (96%)	University and home based programme	USA	Total Sample n = 178 Intervention n=86 Control n=92	Quasi-Experimental Design
Buman[41]	Inactive/insufficiently active community dwelling older adults living in a university community.	Total Sample Range: >50 years (63.42 ± 8.42) Active Intervention (63.49 ± 8.26) Standard Community Intervention (63.35 ± 9.07)	Female (82%) Married (54%) Race - White (91%) Ethnicity Hispanic	Community Only Based Programme	USA	Total Sample n = 91 Active Intervention n = 44 Standard Community Intervention n= 47	RCT
Castro[42]	Inactive (not active more than 60 minutes per week) older adults and living within San Francisco Bay area.	Total Sample Range: >50 years (59.1 ± 6.1) Peer Mentors (64.4 ± 5.8)	Female (65.8%) Ethnicity Caucasian (67.4%)	Community Only Based Programme	USA	Total Sample n = 181 Physical activity advice from staff arm=61 Peer Mentor Arm n = 61 Attention matched control Arm n = 59	RCT

Study	Sample Population	Age Mean (±SD)	Target Population	Setting	Country	Sample Size (number allocated)	Study Design
Lamb[43]	Inactive male and female middle-aged adults	Total Sample Range: 40 – 70 years (50.8 ± 7.7)	Taking <120 mins of MVPA Male (47.7%)	Community Only Based Programme	UK	Total Sample n = 260 Advice Group n = 129 Health Walks Group n = 131	RCT
Parent[44]	Male first time cardiac surgery patients.	Total Sample Range: 40 - 69 years (56.5) Experimental (57.6 ± 7.4) Control (55.9 ± 7.8)	Male (100%)	Home Based Only Programme	Canada	Total Sample n = 56 Experimental n = 27 Control n= 29	RCT
Pinto[45]	Inactive (less than 30 mins/week of vigorous exercise or 90 min/week of moderate intensity exercise per week for past 6 months) English speaking women with stage 0-3 breast cancer (diagnosed in the past 5 years) and had completed surgery.	Total Sample Range: 55-65 years (55.62 ± 9.55) Intervention (55.64 ± 8.59) Control (55.59 ± 10.59)	Ethnicity White (98.7%) Race – Hispanic (6.6%) Married (82.9%) Female gender (100%)	Home Based Only Programme	USA	Total Sample n = 76 Intervention n = 39 Controls n = 37	Quasi-Experimental Design

Study	Sample Population	Age Mean (±SD)	Target Population	Setting	Country	Sample Size (number allocated)	Study Design
Resnick[46]	Inactive urban community dwelling older adults.	Total Sample Range: 60-85 years (73.3 ± 8.5)	Female (79%) Ethnicity African American (77%)	Community only based programme	USA	Total Sample (n = 166)	Feasibility RCT
Thomas[47]	Inactive older adults (>60 years) with no history of CVD of physical disabilities, from 24 community centres	Buddy Support group and pedometer (71.7±5.7) Control (72.4±5.7)	Female (67%) Smoking (53.7%)	Community Only Based Programme	Hong Kong	Total Sample n = 399 Buddy Support group and pedometer group n = 193 Control n = 206	Cluster RCT
Tudor-Locke[48]	Inactive, type II Diabetic male and female participants	Total Sample Range: 38 – 71 years (55.7 ± 7.3) Professional-led Range: 38-70 years (54.8 ± 7.2) Peer-led Range: 42-71 years (57.8 ± 7.4)	Female (82%) Former Smokers (52.7%)	Community only based programme	Canada	Total Sample n = 220 Professional-led n = 157 Peer-led n = 63	Quasi-Experimental Design

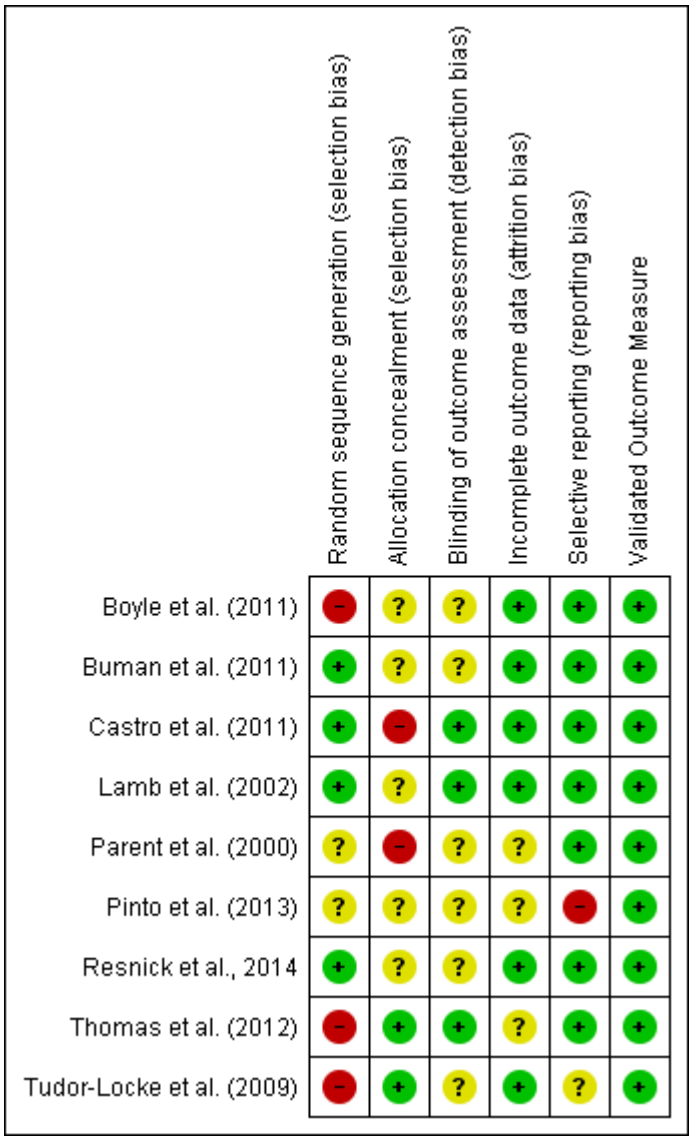
Outcomes

Total physical activity levels were reported in all studies. Physical activity measures varied between studies. However, all instruments were reported as being valid and reliable. Six studies reported only assessing the impact of the intervention on self-reported physical activity levels, including the national health interview survey; [40] Jenkins activity checklist;[44] 'Stanford 5 Cities physical activity questionnaire'[43] and the YALE Physical Activity Survey (YAPAS).[46] One study used an objective measure of walking (Yamax SW-200 pedometer).[48] Other studies used a combination of objective and self-report methods. No studies reported the cost-effectiveness of the intervention.

Methodological quality of included studies

Six of the nine studies employed a randomised controlled design.[40-43,45-46] Allocation concealment was used in two studies.[47-48] A further four studies were at a low risk of bias from random sequence generation.[41,42,43,46] Outcome assessors were blind to the allocation of participants in three of the nine studies.[42-43,47] It was unclear if outcome assessors were blind to allocation in the other six studies. Six of the nine studies were deemed to have a low risk of attrition bias. [40-43,46,48] Reporting bias was only evident in one study,[45] which did not report all of the pre-specified outcomes. Finally, all nine studies reported using a validated measure of physical activity (*see Figure 3*).

Figure 3: Risk of Bias in Included Studies



+=Low risk of bias; ?=Unclear risk of bias; −=High risk of bias

Intervention components

Several common approaches (models) were used to deliver the peer-led physical activity interventions. The first model identified was the *group-based peer education*. The role of the peers was to act as group leaders guiding participants to adopt a new behaviour that facilitated healthy outcomes. Five studies used a group-based approach to deliver the intervention, whereby peer mentors acted as group educators, social leaders or walking coordinators.[40,42-43,46-47] Another model used was the *dyads* model, whereby peer mentors offered one-to-one, 'buddy' type support for participants. Three studies used this approach, with support offered either via in-person contact[44-45] or via the telephone.[41] Finally, one study

offered a combination of group and one-to-one support.[48] Within both models of delivery, peer mentors delivered skills training, goal setting and feedback on progress, problem solving activities, social support and acted as a role model for positive behaviour change. Interventions did not appear to include explicit strategies to encourage maintenance of physical activity. Five of the nine studies were based on a behavioural theory. Theories used were social cognitive theory,[41,46] self-efficacy theory[40,45,48] and social learning theory.[45]

Characteristics of peer mentors

Peer mentors in four of the nine studies shared similar characteristics with the study participants, such as former patients,[44, 45] fellow university students[40] or members of the same community centre (*see Table 2*).[47] Peer mentors in other studies were former research participants,[41, 42] middle-aged lay instructors[46] or trained peer leaders:[48] they were recruited from lists of participants in previous research studies[41, 42] or through existing organisations or groups such as university,[40] patient groups, community centres,[46-47] or peer leadership training courses.[48]

Not all studies detailed the training offered to peer mentors. Those that did so reported training lasting from 6 hours to a full-day.[44,45-46,48] Moderate value resources were offered to support peer mentors, including expenses incurred such as travel and the cost of phone calls (*see Table 2*).[41-42,47-48]

Table 2: Study Characteristics of Peers within Peer-Led Physical Activity Interventions

Study	**Peers Mentor Characteristics**	**Recruitment of Peer Mentors**	**Eligibility**	**Additional Training (Type & hours of training)**	**Ongoing Management of Peer Mentors**	**Incentives for Peer Mentors**	**Resources**
Boyle[39]	Peer Educator was a trainee exercise physiologist enrolled in an advanced undergraduate physiology class	Not reported	Not reported	Trained in physical fitness assessment and programming skills	Supervised by researchers	Not reported	Not reported
Buman[40]	Research participants from previous health promotion studies.	Recruited from a registry of research participants from previous health promotion studies & through a local fair.	Reported having a regular physical activity routine or had a basic background in health education	Not reported	Quality control checklists and scoring procedures were used to give the peer mentors feedback about ways to improve their efforts to facilitate group meetings. Programme staff met weekly with the mentor after each of the first five sessions to give feedback and coaching. Additional feedback was provided as needed throughout the intervention.	Not reported	Volunteered their time without remuneration; however in a few cases mentors were modestly reimbursed for their travel (approximately $15/session).

Study	Peers Mentor Characteristics	Recruitment of Peer Mentors	Eligibility	Additional Training (Type & hours of training)	Ongoing Management of Peer Mentors	Incentives for Peer Mentors	Resources
Castro[41]	Participants from previous research studies	Mailings to previous research participants and announcements to local active aging community groups.	Physically active (at least 150 minutes of MVPA per week) and willing to volunteer for 4-6 hours per week for a minimum of a year	Not reported	Peer mentors were assigned post-training practice sessions identical to professional staff, including assignments to rehearse advice and counselling components and practise completing forms to document the content and delivery of the interventions.	Not reported	Peer mentors were provided with pre-paid telephone charge cards if they wished to make calls to their contacts from home.
Lamb[42]	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported

Study	Peers Mentor Characteristics	Recruitment of Peer Mentors	Eligibility	Additional Training (Type & hours of training)	Ongoing Management of Peer Mentors	Incentives for Peer Mentors	Resources
Parent[43]	Previous patients who had recovered from cardiac surgery.	Recruited by a research coordinator.	Able to verbalise enthusiasm towards increased activity, stimulate motivation and share their successful rehabilitation after surgery	Given 6 hours training by the research coordinator on interaction principles (how to listen empathically and to reflect the patient's feelings) and on cardiovascular disease and treatment	Not reported	Not reported	Not reported
Pinto[44]	Breast cancer survivors who provide information and emotional support for other breast cancer survivors	Recruited from an existing programme run by the American Cancer Society Reach programme.	Not reported	Trained by the American Cancer Society's Reach programme on how to deliver the exercise programme	Not reported	Not reported	Not reported
Resnick[45]	Middle-aged lay instructors	Not reported	Not reported	Full-day training session and a detailed procedure manual	Within an ongoing Senior Wellness Project	Not reported	Not reported

Study	Peers Mentor Characteristics	Recruitment of Peer Mentors	Eligibility	Additional Training (Type & hours of training)	Ongoing Management of Peer Mentors	Incentives for Peer Mentors	Resources
Thomas[46]	Members of community centre aged ≥60 years	Through older adults community centres	Aged ≥60 years, No history of myocardial infarction or stroke and physical disability	Not reported	Supervised by research assistants. Provided with an instruction manual on how to enlist a walking partner	Not reported	Cost of telephone calls were reimbursed.
Tudor-Locke[47]	Nominated by professionals after the completion of a 16-week peer leadership training course	Recruited by professionals after the completion of 16-week peer leadership training course	Not reported	Additional half day training on adult learning principles and facilitation skills.	Not reported	Not reported	Travel costs Peers were given the same resources as the professionals (overhead transparencies, checklists)

BCTs in peer-led physical activity interventions

The BCT Taxonomy v1 is clustered into groupings of BCTs that may be commonly used together in physical activity interventions.[37] Agreement between data extractors was fair (kappa=0.5). Therefore, all papers were reviewed a second time with a third reviewer (MT) to ensure accuracy in BCT data extraction.

Results from the assessment of BCTs identified that the most commonly used BCTs were goal setting (behaviour) (n=7); social support (emotional) (n=7); instruction on how to perform the behaviour (n=7); problem solving (n=6); adding objects to the environment (n=6); demonstration of the behaviour (n=4); behavioural practice/rehearsal (n=4); self-monitoring of behaviour (n=6); social support (practical) (n=6). The most commonly used groups of BCTs employed in peer-led physical activity interventions were (1) Goals and Planning (goal setting (behaviour), n=7; problem solving, n=6; action planning, n=2; and behavioural contract, n=1); (2) Feedback and Monitoring (feedback on behaviour, n=2; self-monitoring of behaviour, n=6; self-monitoring of outcome(s) of behaviour, n=1; feedback on outcome of behaviour, n=2); (3) Social Support (social support (unspecified), n=1, social support (practical), n=6; and social support (emotional), n=7); (4) Shaping Knowledge (instruction on how to perform the behaviour, n=7); (5) Comparison of behaviour (demonstration of the behaviour, n=4; social comparison, n=2); and (6) Antecedents (adding objects to the environment, n=6) (*see Table 3*).

Table 3: Frequency of Behaviour Change Techniques (BCTs) used in Peer-Led Physical Activity Interventions

BCT Label	BCT group	Boyle[39]	Buman[40]	Castro[41]	Lamb[42]	Parent[43]	Pinto[44]	Resnick[45]	Thomas[46]	Tudor-Locke[47]	Frequency of BCT (/9 studies)
1. Goals and planning	1.1 Goal setting (behaviour)	✔	✔	✔			✔	✔	✔	✔	7
	1.2. Problem solving		✔	✔			✔	✔	✔	✔	6
	1.4. Action planning		✔						✔		2
	1.8. Behavioural contract	✔									1
2. Feedback and Monitoring	2.2. Feedback on behaviour			✔						✔	2
	2.3. Self-monitoring of behaviour	✔	✔	✔			✔		✔	✔	6
	2.4. Self-monitoring of outcome(s) of behaviour						✔				1
	2.7. Feedback on outcome of behaviour		✔				✔				2
3. Social support	3.1. Social support (unspecified)								✔		1
	3.2. Social support (practical)	✔	✔	✔	✔		✔			✔	6
	3.3. Social support (emotional)	✔	✔	✔	✔	✔	✔	✔			7
4. Shaping knowledge	4.1. Instruction on how to perform the behaviour	✔		✔	✔	✔	✔	✔	✔		7

BCT Label	BCT group	Boyle[39]	Buman[40]	Castro[41]	Lamb[42]	Parent[43]	Pinto[44]	Resnick[45]	Thomas[46]	Tudor-Locke[47]	Frequency of BCT (/9 studies)
5. Natural consequences	5.1. Information about health consequences				✔			✔			2
	5.6. Information about emotional consequences							✔			1
6. Comparison of behaviour	6.1. Demonstration of the behaviour	✔			✔			✔	✔		4
	6.2. Social comparison					✔		✔			2
8. Repetition and substitution	8.1. Behavioural practice/rehearsal	✔			✔			✔	✔		4
9. Comparison of outcomes	9.1. Credible source				✔			✔			2
10. Reward and threat	10.3. Non-specific reward							✔			1
	10.9. Self-reward	✔									1
11. Regulation	11.2. Reduce negative emotions							✔			1
12. Antecedents	12.5. Adding objects to the environment		✔	✔			✔	✔	✔	✔	6
15. Self-belief	15.1. Verbal persuasion about capability	✔				✔					2
	15.4 Self talk		✔								1

Discussion

In this review of peer-led physical activity interventions, nine studies of fair to good methodological quality were identified (i.e. low risk of bias). Interventions were designed around the social support that peer mentors could offer, either within groups or on a one-to-one basis. Intervention strategies were broadly developed to emphasise the peer mentor as a role model for positive behaviour change. Within the interventions, peer mentors delivered skills training, goal setting and feedback, and problem solving components. To equip them to do this, they were given short training sessions, and offered ongoing support (*see Table 2*). Peer mentors were recruited from either groups of participants in previous interventions, or from community centres. Physical activity was measured using validated instruments, but as self-reported activity may be biased, there is a need for studies using objective measures of physical activity. BCTs in the control groups were not coded, therefore this limitation should be noted as it does not allow the identification of BCTs that were unique to the intervention. However, as we were not assessing effectiveness, this does not have an implication on the overall findings.

The BCTs employed in the interventions included in the review were used in the next stage of our study as the basis of interviews with older adults to determine their preferences for what could be included in an intervention.

Chapter 3: Feasibility and Acceptability of Proposed Behaviour Change and Intervention Strategies (Qualitative Interviews)

Introduction

The rapid review of existing literature (*see Chapter 2*) reporting peer-led physical activity interventions identified common groups of BCTs employed in previous interventions were: goals and planning, feedback and monitoring, social support, shaping knowledge, comparison of behaviour, repetition and substitution and antecedents. This qualitative study aimed to explore the feasibility of using some of the most commonly used BCTs in these groups (goal setting, self-monitoring (behaviour), social support (practical and emotional), problem solving, instruction on how to perform the behaviour, demonstration on the behaviour and adding objects to the environment), in a peer-led intervention for older adults. These BCTs aligned to social cognitive theory (SCT), which emerged from the rapid review as a promising theoretical framework for the design of the intervention. We sought to inform the development of our intervention content by eliciting, through semi-structured interviews, the opinions and preferences of older adults living in socio-economically disadvantaged communities regarding the use of these BCTs.

Methods

The Office for Research Ethics Committees Northern Ireland (ORECNI) gave ethical approval for the study (REC reference number: 14/NI/1330).

Participants

This phase of the study was carried out in the South Eastern Health and Social Care Trust (SEHSCT) area. All electoral wards within the SEHSCT area were ranked by quartiles of the Northern Ireland Multiple Deprivation Measure (NIMDM). NIMDM score is constructed by combining population data relating to seven different domains: income; employment; health deprivation and disability; education, skills and training; proximity to services; living environment; crime and disorder. Community organisations (for example Colin Glen Neighbourhood partnership, Resurgam Trust (community group), Hillhall Road Community Resource Centre, St Lukes Family Centre) located within wards with NIMDM scores in the top 25 percent (most disadvantaged quartile) were approached to facilitate identification and recruitment of potential participants. They were asked to identify individuals aged between

60 and 70 years old living in the target areas (although we accepted some older individuals as they were available). The aim was to recruit a purposive sample of individuals (men and women of different ages and physical activity levels, living in urban and rural settings). None of the participants had experience of walking groups or peer-led health programmes.

Data collection

Semi-structured one-to-one interviews were deemed the most appropriate method of gathering detailed information from participants regarding the feasibility and acceptability of BCTs. Interviews were conducted either in participants' homes or in local community centres. Participants completed a brief questionnaire to provide demographic information and a self-assessment of their current health status (as poor, fair, good, very good). Each interview lasted approximately one hour and all were conducted by a female psychology graduate trained and experienced in qualitative methodology (IMcM).

At the beginning of each interview, participants were informed of the research topic and the aims of the study and asked to sign a consent form. All participants were informed that they could withdraw their support at any time during the process, that their information would be held securely and used anonymously. A flexible interview schedule (summarised in Table 4) was developed for the interview. This included questions about the role of physical activity in day-to-day life and participants' views of setting physical activity goals (goal-setting), using a pedometer to monitor progress (self-monitoring, instruction on how to perform the behaviour, adding objects to the environment), problem solving, working with a peer mentor (social support, practical and emotional) and going for a demonstration walk with a peer mentor (demonstration on the behaviour). Questions were supplemented with copies of self-monitoring diaries, pedometers and photos to elicit responses. A full copy of the interview schedule is included in Supplementary Material 1. After the interview, all participants were debriefed and provided with an opportunity to raise any questions or concerns.

Table 4: Summary of Interview Schedule for Intervention Development Interviews

General
Can you describe your typical day?
When do you feel you are physically active during the day?
Goal Setting and Self-Monitoring
Have you ever heard of a pedometer before?
What do you think are the advantages of using something like a pedometer and diary?
What do you think the disadvantages of using something like a pedometer and diary are?
Problem Solving
Can you think of barriers or obstacles you have faced to increasing your physical activity?
Did you find anything that helped you overcome these?
What do you like about this method?
What do you not like about this method?
Peer Mentoring
What do you think about the idea of using a peer mentor?
What would you want them to do with you?
Do you see any problems with using a peer mentor?
Demonstration Walk
What kind of information would people need to increase their walking?
Where would you like to go?
How often would you want to go?
Are there any problems with using a peer mentor?

Data analysis

Interviews were audio-recorded and transcribed anonymously. In line with current guidelines[49-51] a directed content analysis approach was adopted to understand the emotional responses and preferences expressed by the participants regarding the feasibility and acceptability of implementing the BCTs being examined.[49-51]

Chapter the transcripts, the lead researcher (IMcM) generated initial codes which highlighted pertinent features of the data. This was achieved in a systematic manner by reading each line of the transcript and placing codes in the margins of the text. These initial codes were then

collated into potential themes. The researcher then reviewed the themes in relation to the initially coded narratives, and a thematic map was generated. Sufficient time was given to this coding process to ensure that coding was as robust as possible. The codes and themes were then given to another member of the research team (CC) who was familiar with the transcripts who then confirmed the validity of the key themes. In addition, researchers (MEC & ES) experienced in qualitative analysis also reviewed the themes and subthemes. After 11 interviews, data saturation was achieved; another interview was completed to seek confirmation of the analysis. The findings were discussed with six participants in follow up meetings during the intervention development phase for validation.

Results

The characteristics of each participant are summarised in Table 5.

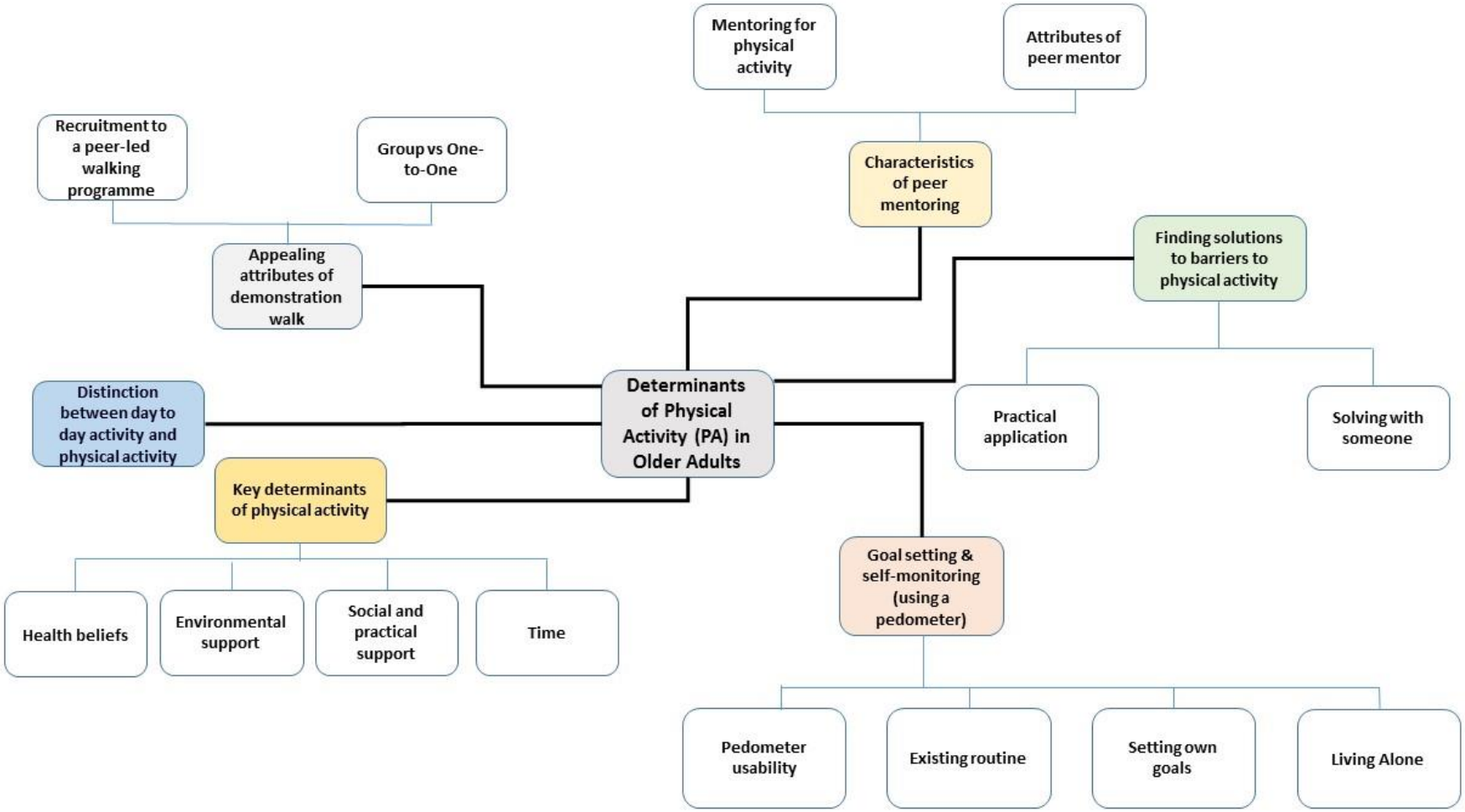
Table 5: Characteristics of Participant in Intervention Development Interviews

Participant ID	Sex	Age (years)	Employment Status	Health status	Health problem limiting normal daily activities	Highest education level	Home owner	Living with partner or living alone	Number of people in household
1	Female	61	Retired	Fair	No	Secondary School	Own	Alone	1
2	Male	92	Retired	Good	Yes	Secondary School	Own	Alone	1
3	Female	77	Retired	Fair	No	Secondary School	Own	Alone	1
4	Female	70	Retired	Poor	Yes	Secondary School	Rent	Partner	2
5	Male	80	Retired	Fair	No	Secondary School	Own	Alone	1
6	Female	67	Retired	Good	Yes	Secondary School	Own	Alone	1
7	Female	60	Full time work	Good	No	College	Own	Partner	3
8	Female	62	Retired	Excellent	No	Secondary School	Own	Partner	2
9	Female	65	Retired	Fair	Yes	Secondary School	Rent	Partner	2
10	Male	63	Retired	Fair	Yes	Secondary School	Own	Partner	2
11	Male	72	Retired	Fair	Yes	Secondary School	Rent	Partner	2
12	Male	72	Retired	Poor	Yes	Secondary School	Rent	Living alone	1

Themes

Key themes and subthemes are depicted in Figure 4. These included a distinction between day-to-day activity and physical activity; key determinants of physical activity; goal setting & self-monitoring using a pedometer; characteristics of peer mentors; finding solutions to barriers to physical activity; and appealing attributes of demonstration walking. Themes are reported below, supported by relevant quotations which are anonymised.

Figure 4: Thematic Map of 'Walk with Me' Intervention Development Interview Data



Theme 1: Distinction between day to day activity and physical activity

The interviewer clearly defined physical activity as activities where people were 'up and about' and ensured participants understood that physical activity was not limited to activities that were structured, such as going to the gym. In terms of the discussion, individuals echoed this understanding and described their typical day which consisted of the activities of daily living including housework such as laundry, cooking, and cleaning, as well as carer responsibilities for either grandchildren or partners:

> **Participant 9:** *"...just have breakfast. And so I make my husband's breakfast cause he's not in good health...going to do the washing...go and get your washing upstairs and bring it down...I'd be up the stairs all the time...And would I never rest. I do knit..."*

The majority of individuals appeared to be busy simply carrying out day to day living activities and physical activity was regarded as something that was for leisure, and not something that was 'necessary'. It was also mainly limited to a number of physical activities among which walking and gardening were the most frequently mentioned:

> **Participant 3:** *"...the morning part of it was active enough, certainly, because erm my flower bed had got decidedly overgrown and um it needed a great deal of hoking and poking to get it into any sort of order at all."*

> **Participant 4:** *"My only activity at, at the moment is walking. Walking my dogs."*

The findings suggest that older adults are potentially less physically active and may not be meeting recommended guidelines relating to PA:

> **Participant 2:** *"Really that's all my activity because I'm not sport minded or anything (laughing)"*

Theme 2: Key determinants of physical activity

Individual discussions suggested that there was a complex interplay between individual beliefs about their health and how physical activity would affect it; the environment in which

they lived and whether it allowed access to appropriate areas to walk; the level of support that they received, whether physical or social; and the amount of time that they could devote to physical activity. These various factors all appeared to have a potential influence on physical activity levels.

Health beliefs

Participants expressed feelings about the 'inevitability' that physical activity would decline over time due to changes in health and changing social circumstances:

> **Participant 3:** *"But unfortunately with erm the deterioration in my wife's health I was gradually dropping, and the fact that I was getting older anyway (laughs)."*

Participants also suggested that existing health conditions prevented them from increasing their physical activity level.

> **Participant 11:** *"Although I haven't done it [physical activity] in about 2 months. Erm I think that one day I just done a bit too much and then fluid gathered in my knees. So, I need to be careful not to over do it."*

However, participants also suggested that poor health could also be a motivator to increasing physical activity in the belief that it could alleviate the symptoms of existing conditions or even prevent new ones from developing:

> **Participant 9:** *"I'm trying to use the hands. Trying to use the limbs by bending up and down...I still do it because I have to do it."*

Also, participants expressed a belief regarding the benefits of physical activity, for example for better mental health and weight management. Participants expressed different beliefs regarding their level of actual physical activity where some believed that they should be taking more physical activity and others believed their physical activity levels were adequate.

Participant 9: *"You're out walking, you're out active, you're, you feeling better in yourself and your whole head lifts. My husband suffers badly with depression so, when we're out walking, it lifts him. You're out. Know what I mean?"*

Participant 11: *"I'm conscious that I need some sort of walking. Some sort of activity. I've retired now around 2 years. And erm I've noticed I've put on a bit of weight and I have myself, a certain weight I will not go over and I'm, you know, erm, normally watching my weight. And I am conscious that I need to be more active."*

Participant 10: *"We are active, active enough. At the moment like...hopefully it stays that way."*

However, the mixed belief regarding adequacy levels of physical activity may have been due to a misunderstanding or lack of awareness of the actual physical activity guidelines.

Participant 9: *"...but I don't know what 300 steps would mean. Would that mean it's good or bad?"*

Environmental support

Participants mentioned fear of traffic (cars and bicycles), dogs, antisocial behaviour and bad weather as key barriers to physical activity even when appropriate places such as parks were available in their local areas.

Participant 3: *"Erm (coughs) I think that is becoming increasingly difficult as the roads, the roads have got so busy now. Aye. It's not so pleasant. I can see myself now, um being reluctant enough to walk the roads with my dog because there's so much traffic and so few now with...easy green edges to the roads where you can walk in comfort."*

Participant 9: *"There's green fields over there...But you wouldn't walk. I mean I could walk about during the day, it's fine. But at night, no, I wouldn't."*

Participant 11: *"Well I, I, don't like walking round tow paths so I do not 'cause it's full of dogs' doo doos and broken bottles. I don't like that atmosphere along it. I like*

round XX bridge. I like places like that. You know, there's good fresh air and you meet other people. You know what I mean? Somewhere like that you know. Or up the XX park. Now I would walk round XX park."

Participant 12: *"I used to go to XX path but erm the amount of cyclists in that area. You're just constantly stopping and starting and looking round you. And mostly cyclists. They don't have a bell anymore and erm, …, they would probably frighten you sometimes. They're right behind you before you realise they're there."*

However, having places to walk that are safe and accessible, or places that allowed them to get in touch with nature, could help to increase physical activity levels.

Participant 13: *"Well all the trees. There's trees and nature. You see ducks and you see…So you go up there and you see ducks, and cows. Just trees. It's not vandalised, not wrecked and ruined and destroyed. You know what I mean? So when you go up to the XX bridge, 10 minutes away in the car, sure it's like a different world isn't it?"*

Social and practical support for physical activity

Participants expressed a preference for combining social interaction with physical activity, thus making physical activity more enjoyable by focusing attention on socialising rather than the activity itself.

Participant 8: *"I would like that one if you were going out with friends...you wouldn't realise the distance...you don't see time"*

Participant 12: *"…you're talking away and you're. I would say, erm, and I would even think a couple of them there people would forget about their ailments when there's a crowd cause they're talking about different things."*

Comments suggested that increased social support also increases confidence through learning from others or through the feeling of increased safety from the presence of others.

> **Participant 10:** *"Safety in numbers. People feel safe out walking along with somebody else. Cause we're afraid of the dogs and young ones and all messing about in the parks. Not so bad if...I'm on the toll path. But I've walked round XX park and I've felt a wee bit uneasy in it..."*

In addition, physical support was also a motivator to increasing physical activity whereby providing physical aids to carry out gardening, or a secure physical environment could increase physical activity levels.

> **Participant 9:** *"Give me the tools. Instead of you bending down in pain, get the tools to dig but you standing up...so that would be. I would need to get out there and buy those tools that would be my solution. That's my barrier."*

However, the intensity of social support was seen as an important determinant of physical activity where both lack of support and too much support were potential barriers to physical activity.

> **Participant 9:** *"...if I need to go somewhere, to the hospital for an appointment to the clinic, my daughters are down straight away. Pick me up in the car, so, I don't get to walk, and I would, and that, that would stop me from, you know."*

Time

Participants suggested that their lack of physical activity was due to lack of time with regards to the many other activities that they took part in as well as the carer responsibilities that they had for either partners or grandchildren.

> **Participant 7:** *"I would like to have been gone out and having a walk. But that's like a barrier. I have to stay in and mind three children."*

However, even when time was available, participants preferred to take part in less intense physical activities such as knitting and reading and so appeared to lack motivation to increase their physical activity level.

> **Participant 7:** *"I put her into the activity centre and then I'd sit and chat to my friends"*

> **Participant 7:** *"...drops me off...and will come back and pick me up for I wouldn't walk all the way back."*

Theme 3: Goal setting & self-monitoring (using a pedometer)

Self-monitoring and goal setting were perceived as helpful approaches to increasing physical activity, and in particular participants perceived that the pedometer would have a positive influence on their activity levels. Four sub-themes were highlighted: pedometer usability; existing routine; setting own goals; and living alone.

Pedometer usability

In general, participants expressed a positive attitude towards the pedometer.

> **Participant 11:** *"Yes that would be a good thing. Yes. ...my son… uses that at work. He'd walk 5 mile a day."*

There was a general awareness of the pedometer with all participants, who had either seen or heard of a pedometer before. In fact, one participant had actually used a pedometer for monitoring steps previously for a different study.

> **Participant 9:** *"...and that would keep me active. That would keep me more active than erm because I do walk about a bit in the home..."*

> **Participant 10:** *"Yes. I've seen them before. Our kids got them one time at MacDonalds...wee wee yellow ones, and they were using them..."*

However, despite the overall positive view regarding pedometers, there were concerns about their actual use in practice.

> **Participant 10:** *"Sure the last time...there wasn't a step come up on it. So I wonder if this one's working? That one wasn't working sure it wasn't?"*

In addition, participants also highlighted that pedometers should be simple to use:

> **Participant 4:** *"I don't want something like a magic phone...because I'll not be able to use it (laughs)"*

> **Participant 5:** *"well that there's handy...where erm you just, say clip it on to your jeans or something, and um, you just push a button and it starts, and pushes a button and it stops. Anything complicated, I wouldn't be able to use, you know. But something like that there!"*

Participants also suggested that the device should be easy to wear and easy to see:

> **Participant 8:** *"You have to be able to see it...the other one I used you were constantly putting your glasses on and off so that was a distraction too. But that has a nice clear face."*

> **Participant 8:** *"...the way I thought that if you could get like an arm band...it's better than having something clipped on you."*

Existing routine

Participants expressed an interest in using the pedometer because they felt that it would fit into their existing routines. For example, participants preferred to, or were more interested in, monitoring or counting current steps rather than trying any additional or new types of activities:

> **Participant 10:** *"...so I really have a routine, most of the week...and then I'd be able to see what I'd done one day and what I'm doing on another day. Some days wouldn't be as many as others. So it would give me a, a bit of a picture."*

This does however show that the provision of pedometer per se may not be sufficient for behaviour change and that participants need to be encouraged to use it to set step goals and monitor progress.

Participant 10: *"But I wouldn't want to be doing this diary all the time."*

Setting own goals

Participants expressed a preference for being able to set their own goals, as opposed to having them set by someone else. This was mainly due to the feeling that self-set goals would be tailored to their own physical fitness or capability rather than general goals that might not be achievable.

Participant 12: *"Well the goal setting, because it's, as long as it's, I set my own goals...you know…and doesn't put too much pressure on individuals to achieve them."*

Participant 12: *"It would really encourage you, I'd be 'here, I gotta go out the night and all. I've got to fill this here in. see how many steps I'd done… It would encourage me just to be able to look and say 'Look what I've done-8000 today', and then when it's coming up to tea time I'd be going 'come on let's go and do another one…we'll maybe try and get up to ten'...I think that would be encouraging."*

There was also a feeling that even if goals were set that there should be flexibility to take account of 'off' days when existing conditions or tiredness might prevent them from achieving the targets.

Participant 12: *"I would get maybe, say for arguments sake, about 50 yards before the pain, the pain gets gradually worse...you know. When would you want me to draw the line?"*

Lastly, concern was expressed over the added pressure that setting goals might put on them despite the fact that it would motivate them to try and increase their physical activity levels.

Participant 12: *"I wouldn't want the guilt on me...if I didn't do the right amount. And I wouldn't want to be feeling that I'd fallen behind..."*

Living alone

Setting goals and monitoring activity using a pedometer was viewed as a solution that was potentially useful for people living alone because it could be operated independently without any additional support.

> **Participant 5:** *"even in the house, you could do that on your own with the pedometer...that would interest me"*

Participants expressed a view that people living alone could easily slip into levels of non-activity because there was no one else to motivate or encourage them to take part in physical activity. They saw the pedometer as a source of motivation and encouragement.

> **Participant 3:** *"And in fact in a family environment possibly the, the advantages might be doubtful. But for anyone living alone. I think it would be a very useful in that it's quite easy to lapse into a way of life which...would predominantly inactive..."*

Theme 4: Characteristics of peer mentoring

Social support, in the form of peer mentoring was viewed favourably by participants and comments suggested that, for a peer-led intervention to be successful, then the specifics of both the peer and the activity should be considered. In addition, participants suggested that a minimum of once a week could be considered for meeting with the peer mentor. Some participants said they would prefer to have peer contact by telephone contact whilst others suggested face to face contact would be preferred, at a neutral location rather than at their home address.

Mentoring for Physical Activity

Participants identified key components of the activity that needed to be addressed in order to motivate them to take part. Firstly, the activity needed to be well planned, in terms of both timing and route of walking but arrangements needed to be flexible:

> **Participant 11:** *"When he phones and lets you know what's happening in advance then you can pre-plan what's going to happen or pre-plan to go to these different activities"*

In addition, participants felt that the programme planned should create opportunities to try new activities such as swimming, to visit places within their local area or outside of their area that they hadn't been before, or to retry old activities which had stopped because circumstances had changed, for example through an illness. Attention should also be given to including activities which the participants themselves identified as being pleasurable:

> **Participant 4:** *"I do feel peer mentoring can introduce you to new ideas. Just because you're elderly, it doesn't mean to say you can't have new ideas...you can show the peer something that you enjoy doing..."*

Activities needed to reflect the shared interests and the capabilities of both the peer and the participant:

> **Participant 4:** *"I'd be interested in what they [the peer mentor?] would like to do too".*

> **Participant 3:** *"People might be reluctant to go out with other people on the basis that they might be...walking much further than they would"*

Additionally, the benefits of any activities planned should be stated at the outset of the programme so that there could be an understanding of the purpose, in order to increase motivation to participate.

> **Participant 9:** *"...she said it was good for your health. Good for your mental health, and once she mentioned mental health sort of thing, people listened. And this'll relax you and relieve stress of the day."*

Also, although the aim of the physical activity intervention may be to increase levels of activity its other potential beneficial effects were of significance. One interviewee commented on how motivation to continue with the programme long-term was derived by positive experience of it, specifically reporting how it helped promote relaxation.

> **Participant 9:** *"So relaxing. And that's what got me motivated."*

Attributes of the peer mentor

The attributes of the peer were considered to be key in ensuring the success of a peer-led intervention. Participants expressed a desire that not only should the peer mentor be experienced and well trained, but also that they had medical awareness in order to build confidence and trust.

> **Participant 4:** *"...if they have got experience, that can restore your confidence, offering advice, discussing problems...Problem solving with you..."*

> **Participant 10:** *"...the peer would need to know, look this woman has high blood pressure, and this one has diabetes and she needs to carry something…Now my friend, she knows me well, and she has asthma and see before we go out like, XX knows to have all her things with her and she, she lets me know. So, that I'm aware when I'm out with her that this is a bag she has this particular coloured inhaler in…"*

In addition, although participants did not feel they needed to share the same demographic characteristics as the peer mentors, such as age, they did consider that a peer mentor needs to be someone who is themselves physically active and physically capable to help and provide encouragement. However, it was also noted that other resources should be readily available if help was needed.

> **Participant 9:** *"Even a young person. It wouldn't matter what age they were. I think a young person anyway would get you up and get you out."*

> **Participant 5:** *"As long as they were a wee bit more active, ...that they were able to...erm. It would be no good if they were worse than me probably. ……. these days we all carry mobile phones."*

The only other characteristic of the peer that was identified as important was gender. It was considered that gender should be the same as the participant and that perhaps participants who had existing partners may not need a peer. The most important component of a peer-led intervention for participants was the relationship that would develop. All participants felt that

the relationship should be based on friendship and there were a few key components identified that could secure the success of friendship development. Firstly, participants identified the need for shared interests between the peer and participant, and several participants described a 'matching' concept similar to dating where the peer's interests and the participant's interests were matched to ensure compatibility.

> **Participant 4:** *"before a peer was selected, that ……. there was a list that you could put down the sort of things that interest you"*

> **Participant 13:** *"Well I would like go out with somebody that's not doom and gloom. A bit of jokiness…that's what you need. What would be important to walk with is 2 or 3 people that you can have a wee bit of banter. You don't want to hear about the price of tea. You don't want to hear about their aches and pains. I don't want to be conferring about aches and pains with anybody. I would avoid having a walk."*

Participants suggested that the peer should be voluntarily motivated to spend time with them rather than being paid to do so.

> **Participant 4:** *"...rather than...someone who is duty bound, to go 'walkies' on Wednesday afternoon, no matter whether it's pouring or, or the roads are icy or whatever..."*

By developing a friendship there was a feeling that a stronger bond of loyalty would develop, which would act as a physical activity motivator. In other words, friendship would ensure that people would be more reluctant to let others down and incentivise them to meet and carry out activities with the peer.

> **Participant 3:** *"There's always the, the feeling that 'well I should turn up' because if I don't I'm letting, letting them down"*

Theme 5: Finding solutions to barriers of physical activity

Participants were not aware of what problem solving might involve until it was explained to them. However, it was one of the most preferred options, perhaps because participants felt

that it was something that they did on a day to day basis anyway. It was considered that problem solving should be integrated into an overall programme rather than being used as a standalone activity.

> **Participant 3:** *"I mean, if you're, you're getting to the point of deciding that we're going to have regular walks together you would then come down to the point of where you were actually going to go."*

However, participants identified many potential barriers relating to physical activity such as health related issues where, for example, arthritis may prevent walking or gardening, fear for personal safety may prevent walking in areas that were not busy or crowded, and child minding responsibilities meant that it could be difficult to find time for physical activity. In general, participants felt that finding solutions to barriers was a useful exercise and that problem solving with another person could help them see the broader picture and find solutions that they may not find by themselves.

> **Participant 9:** *"It's great if somebody helps me, because I just see the barrier. You know? And then if somebody like you was to talk about I would go 'yeah that would be a good solution there', you know."*

However, there was a concern that solutions needed to be applied, progress monitored and feedback given on an ongoing basis to ensure success:

> **Participant 2:** *"It's just not practical. No."*

Theme 6: Appealing attributes of the demonstration walk

The inclusion of a 'demonstration walk' within the proposed intervention, whereby the peer mentor and participant would go for a walk together, in order to demonstrate potential routes and locations in the local area, was not widely welcomed. The majority of participants suggested that they might consider taking part in a peer-led walk on a weekly basis if the areas outlined in the peer-led activity (above) were addressed. In addition, two areas were identified that could increase motivation to taking part in the demonstration walk.

Group vs one-to-one peer walk

There was a sense that participants felt that a demonstration walk, as a group activity, could make it seem like a more enjoyable activity, as the walk could provide an opportunity to meet other people with common interests and friendships could be developed within the group.

> **Participant 4:** *"Where there are other people like yourself who would welcome you, welcome you company."*

There was also a feeling that a group could avoid some of the difficulties that perhaps may arise in a one-to-one peer relationship. Thinking of performing the activity as a group was considered to be less daunting and to offer greater opportunity to meet someone with similar interests and capabilities.

Participant 5: *"...maybe even 3 or 4 people, ...because maybe in a group, it's easier."*

However, participants also perceived that, whilst the group had advantages over a one to one peer relationship, it was felt that it could be less attractive because it felt more like a structured activity and could be a less flexible arrangement:

> **Participant 4:** *"A structured appointment is, is not a good idea, um, because older people have good days and bad days or don't fancy putting on a, a waterproof and braving the storm."*

> **Participant 4:** *"I don't really like the idea of a structured appointment"*

Recruitment to a peer-led walking programme

In considering preferred approaches to recruitment, some participants reflected on their experience of joining various clubs. Whilst they had joined clubs in response to seeing information about them, they knew of other people who would have been eligible to join but did not.

> **Participant 11:** *"There's a lot of people in the same situation as what I am in the area but they don't seem to be coming forward"*

There was discussion within the group relating to the targeted selection of individuals for invitation to join a peer mentoring intervention. It was considered that such an approach from someone would have been a more effective method of encouraging recruitment and an example was given of how a personal approach had engendered enthusiasm for accepting an invitation to participate in other activities. Such a personal approach to recruitment, rather than relying on posters and leaflets, was considered appropriate in order to ensure common interests or capability amongst prospective participants.

> **Participant 11:** *"Well I was stopped one time when, when I was in shopping and this guy stopped me and erm he was telling me that he was trying to set this group up for a certain age, well not a certain age, but a certain gender of people and he was telling me the activities that they plan..."*

It was emphasised in the discussion that information relating to how to join a peer mentor walking group should be made very clear and that the process of recruitment should be as simple as possible for older individuals.

> **Participant 3:** *"Well, ... I'm not sure how they get in contact with people or do you have to get in contact with them? They [walking groups] might well make it easier for people to get in touch with them."*

Discussion

Interviews revealed that older adults live busy lifestyles including housekeeping and carer responsibilities, and therefore engaging in other regular physical activity was not seen as a necessity. Walking appeared to be a common and preferred activity across all participants.

Similar to previous research,[52] the findings suggest that increasing physical activity in older adults is a complex phenomenon due to the complex interplay between physical, psychological and environmental factors. For example, the current study identified that health

related beliefs, social support, and the characteristics of the local neighbourhood environment are important determinants of physical activity that need to be considered in the development of any physical activity intervention development. However, the current study findings revealed that there were key areas within each BCT which should be explored with a target population in order to address their barriers to physical activity.

Participants reported leading busy lives, which are not necessarily physically active. In order to increase physical activity, interventions should seek to increase awareness of actual recommended physical activity guidelines and highlight the key health, emotional and social benefits of physical activity for older adults, in order to persuade older adults to prioritise physical activity.

Tailoring interventions with personalised physical activity goals, such as step goals[20] can lead to sustained increases in physical activity. Our participants reported that they liked the idea of goal setting and self-monitoring because of their ease of use and the possibility for integration in existing routines, which would lead to increased self-efficacy for physical activity.[53] However, the interviews revealed the importance of participants setting their own goals and of the usability of devices, so attention must be paid to selecting the right activity monitor (simple, easy to read, easy to carry, and robust), delivering appropriate training on how to use it, and allowing goals to be set by participants.

Providing physical activity in combination with appropriate levels of support, whether physical support like gardening tools or walking aids, social support like peer mentoring or demonstration walking, or simply providing physical activity within a social setting, could decrease feelings of social isolation and loneliness, and increase feelings of motivation, confidence and safety, as well as make physical activity feel more enjoyable, and ultimately increase overall levels of physical activity. Interventions that capitalise on social inclusion such as peer mentoring or a demonstration walk have great potential to succeed in increasing physical activity. [52] However, the relationship between the peer or within the group is important to ensuring success, so a matching exercise to ensure shared interests between the peer/group and participant is key.

Discussion about the environment identified several defining characteristics that could increase physical activity. For example, individuals suggested that important features of the environment included a facilitated environment (well-maintained paths, aesthetically pleasing, scenic, close to nature, free of pollution), safe (free from traffic, cyclists, dogs, and crime), and accessible (local or not). They also mentioned bad weather as a barrier to physical activity. Thus, it is suggested that planned activities should take place away from traditional physical activity locations such as gyms but with a physically supportive environment (one that is 'walkable') where transportation is available or organised, and which also provides indoor or protected locations to facilitate walking in any weather. Also, discussions around the demonstration walk identified a need to ensure robust recruitment that was proactive and personal to promote participation.

Interviews revealed conflicting beliefs relating to health, where individuals expressed the belief that physical activity could prevent and improve symptoms of current health conditions like arthritis, but also that physical activity could create health issues through physical exhaustion or make existing symptoms worse which could result in a lack of independence and the loss of the ability to get out and about. Thus, pain management is key to increasing physical activity, as is the tailoring of physical activity to individual needs.[54]

In summary, there is merit in utilising each of the BCTs explored within the context of this study as each addresses barriers to physical activity. Interventions which include goal setting and feedback, problem solving, social support through peer mentors and behavioural practice with a peer mentor, as identified through the interview discussions, are perceived to have the greatest likelihood of succeeding in increasing physical activity in an older population living in an area of socio-economic disadvantage

Chapter 4: Development of the 'Walk with Me' peer-led walking intervention to increase physical activity in inactive older adults

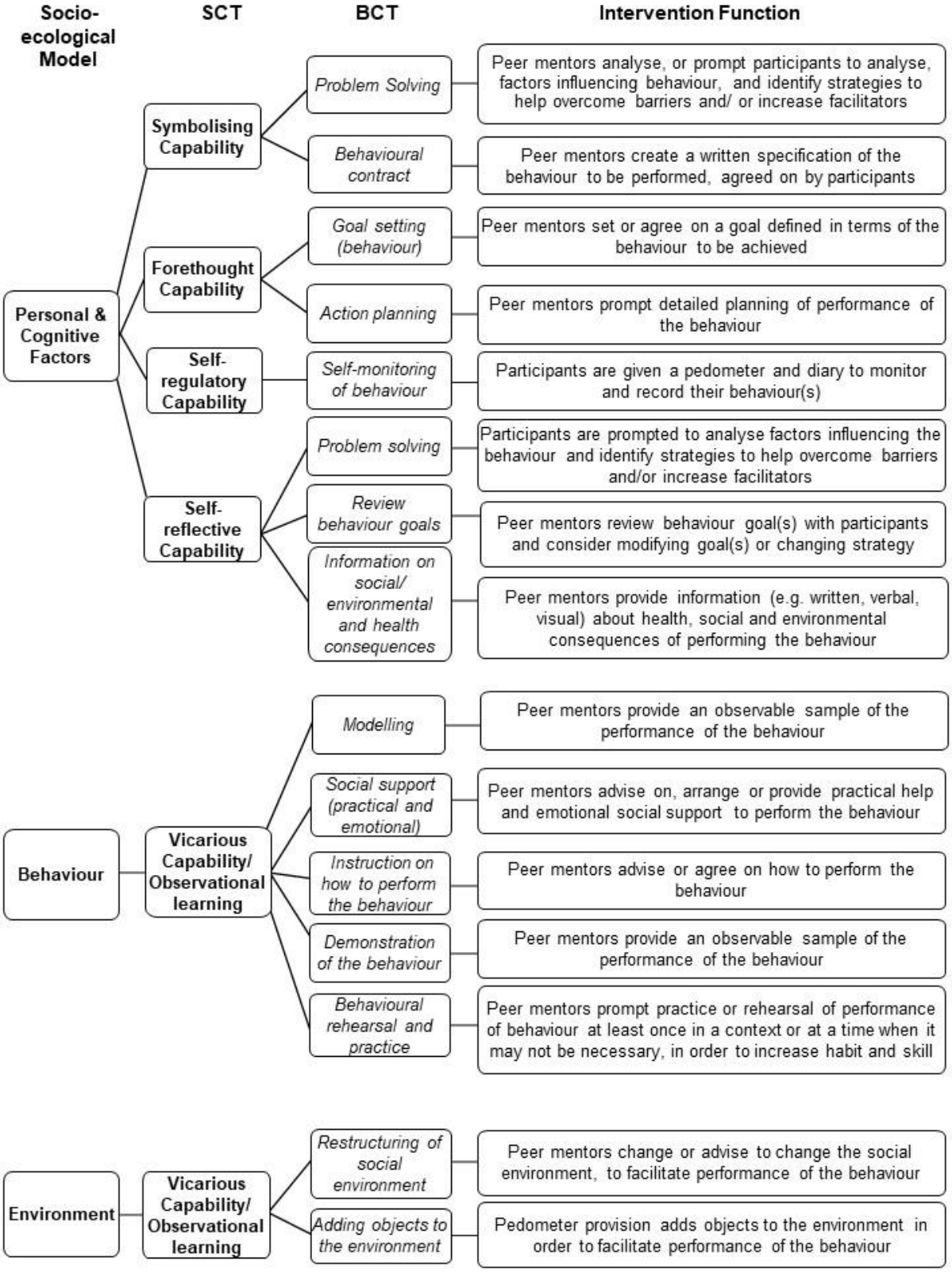
The first phase in development of the complex intervention was to gather relevant evidence and theory to develop a logic model for the intervention, including the proposed causal pathways and relevant outcome measures. From the rapid review of peer-led physical activity interventions, the most common groups of BCTs used previously related to goals and planning; feedback and monitoring; social support; shaping knowledge; comparison of behaviour; repetition and substitution; and antecedents. The intervention development interviews also identified other BCTs specifically relating to the health benefits of physical activity (Information of the Health Consequences). The Behaviour Change Wheel[55] was used to map promising BCTs (those that were successfully used in previous interventions in the rapid review and were deemed feasible to deliver within the proposed context) on components of behaviour which reflect multiple levels: motivation (reflective and automatic), opportunities (physical and social environment) and capability (physical and psychological). The main output from this stage was a shortlist of proposed BCTs mapped on to key intervention functions, for inclusion in the design of a pilot RCT.

In the next stage, we explored the perceived feasibility and preferences for strategies which included particular BCTs through interviews with older adults from our target communities. Taking account of the interview findings enabled us to avoid or overcome potential barriers to implementation within the intervention design, and to incorporate elements which were perceived to facilitate walking.

SCT[56] was used to provide a theoretical framework for designing the intervention as it maps well onto the socio-ecological model and the role of physical, psychological and environmental factors on physical activity, that were identified in the interviews. SCT proposes that personal, environmental, and behavioural factors reciprocally influence behaviours. BCTs identified through the rapid review were mapped onto the core set of psychosocial determinants and intervention functions (i.e., self-efficacy, outcome expectations, goals, and impediments and facilitators) of SCT (*see Figure 5*). In addition, the socio-ecological model was used to provide a framework for a multilevel intervention design[57] that addresses multiple levels of determinants including individual, social and

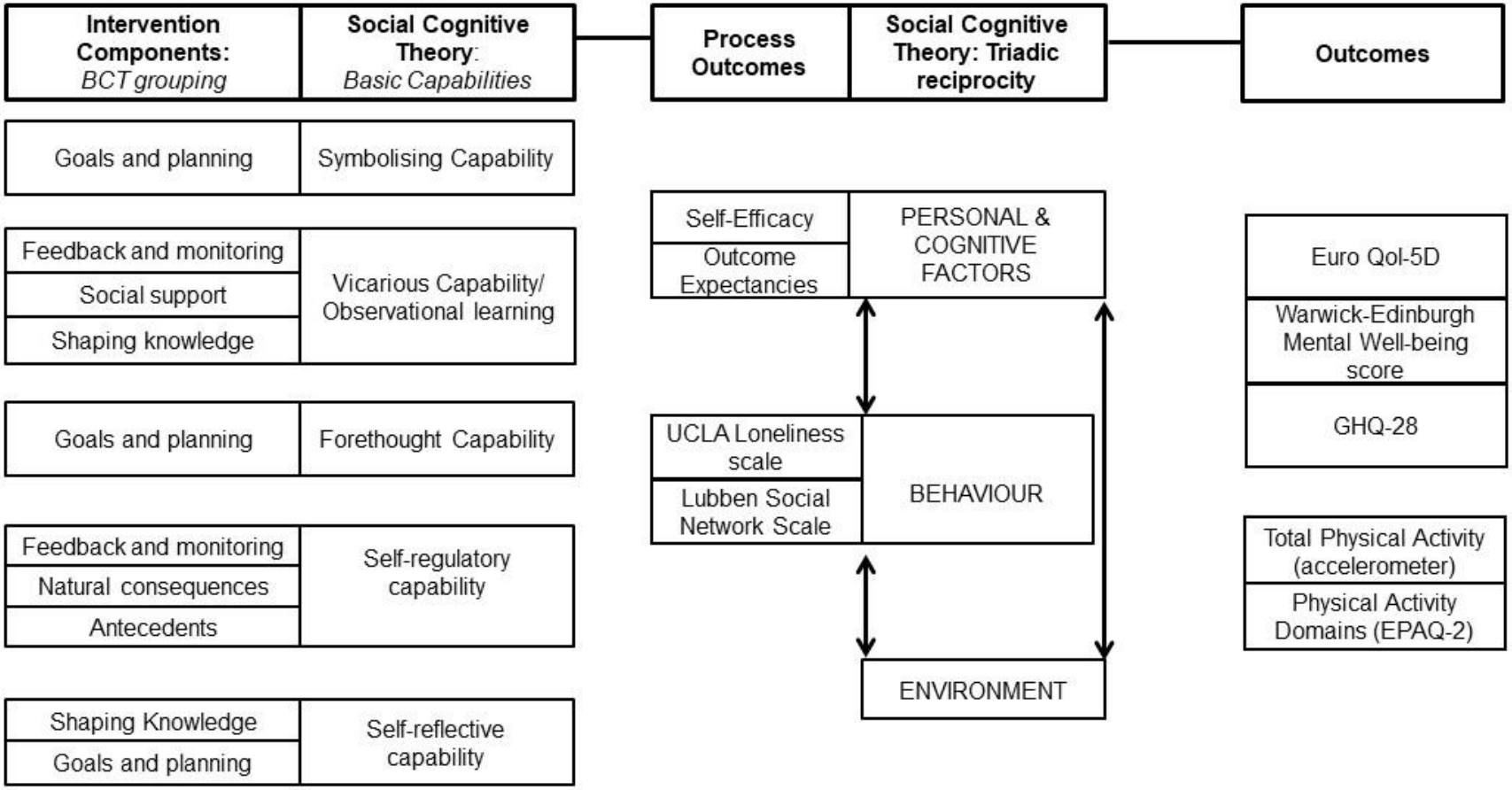
environmental factors. In addition to individual factors (such as feedback on current behaviour), we planned to address social factors, by providing peer mentors to act as a social support for change, and environmental factors by matching the programme to local environmental opportunities.

Figure 5: BCTs Mapped to Intervention Functions, SCT and Socio-Ecological Model



The logic model developed for this study (*see Figure 6*) illustrates how the key intervention functions (BCT groupings) align with the basic capabilities of SCT,[56] and how the process and behaviour outcomes of the intervention were measured.

Figure 6: ‘Walk with Me’ Logic Model



Chapter 5: Methods for a pilot RCT of a peer-led walking programme to increase physical activity in inactive older adults

The aim of this phase of the project was to test the feasibility of delivering and evaluating a complex peer-led, multi-component physical activity intervention in socio-economically disadvantaged community dwelling older adults.

The objectives of the pilot RCT were to:

7. determine the most efficient methods of recruitment to a peer-led physical activity intervention in older adults.
8. assess the resources needed for the development of a future definitive trial.
9. assess the feasibility of a RCT of a peer-led walking intervention in older adults in terms of rates of recruitment, retention and data completeness, the administration of outcomes and the acceptability of the intervention.
10. generate data to inform what sample size would be required in a definitive trial of a multilevel peer-led physical activity intervention, based on the variability in objective measurements of physical activity and recruitment and attrition rates.
11. measure the resource use associated with the intervention and estimate costs.
12. pilot the use of a health and social care service use instrument and summarise the resource use and costs per group.

Participants

Community dwelling older adults, aged 60-70 years and living in areas of socio-economic disadvantage, were targeted by this study. For this study, socio-economically disadvantaged communities were defined as those falling within the most disadvantaged quartile of electoral wards, based on the Northern Ireland Multiple Deprivation Measure (http://www.nisra.gov.uk). For ease of administration, the pilot study was conducted in the South Eastern and Northern Health & Social Care Trusts (Northern Ireland), which cover a large geographical area and a mix of urban and rural settings.

Recruitment

Previous research has identified difficulties in recruiting participants from socio-economically disadvantaged communities.[58] We therefore employed a range of active and

passive recruitment strategies to maximise the potential for efficient recruitment and to explore which methods appeared most effective. Active strategies involved the identification and referral of potential participants by community and voluntary organisations and in-person presentations to community groups based in target communities. Passive recruitment methods included sending study information, along with a letter from their General Practitioner to suitable patients from primary care practices in target communities; distribution of leaflets and posters through general practices, community centres, libraries, health centres, faith-based groups and churches and the email lists and social media outlets of project partners. All practices with postcodes in the target electoral wards were identified from the Business Service Organisation (BSO) records in Northern Ireland. Eleven practices were chosen for initial contact, selected with the aim of recruiting participants from a range of geographical locations and with varied characteristics. The practices were contacted by telephone and brief information was passed to the practice manager with an invitation to meet with the researcher to discuss the study in further detail. Each practice was offered an honorarium of £150 in recognition of their time and administration costs in setting up the study, with a further £50 if two or more of their patients participated in the study.

Individuals who wished to participate were asked to contact the study team by telephone, in writing or by email. Following initial contact, participants were screened for eligibility and invited to return written consent to participate. Those participants who were eventually recruited were asked how they learned of the study.

Eligibility criteria

The following inclusion criteria were employed to assess eligibility:

- Male or female aged 60 – 70 years.
- Living in a socio-economically disadvantaged community (defined as the lowest quartile of super output areas according to the Northern Ireland Multiple Deprivation Measure)
- Competent to give informed consent.
- Not currently physically active (assessed using the General Practice Physical Activity Questionnaire).[59]
- Community dwelling (i.e. living in their own home).
- Planning to stay in the current residence during the next year.
- Able to communicate in English.

- No self-reported recent history (within the last six months) of myocardial infarction or stroke, or physical limitations that would limit ability to participate in a walking programme (assessed using the Physical Activity Readiness Questionnaire).[60]

Randomisation & allocation concealment

Following the completion of baseline outcome measures, participants were randomised to the intervention or control group using block randomisation with randomly permuted block sizes. An independent statistician from the Northern Ireland Clinical Trials Unit generated the randomisation sequence using a computer programme, and treatment allocations were concealed in sealed, sequentially numbered opaque envelopes. The envelope was not opened until after completion of baseline measures, whereupon participants were informed of their group allocation.

'Walk with Me' intervention

The 12-week intervention comprised of three stages: activation (weeks 1-4); goal setting and problem solving (weeks 5-8); and signposting participants to other activity programmes in their community to encourage them to maintain their activity (weeks 9-12). Typically, meetings between mentors and participants began in an environment (community centre/coffee shop close to the planned walk location) where they could discuss the previous week in relation to the participants' physical activity patterns. They also used this time to complete study records by using weekly templates (see appendix 3), discussing goal setting and problem solving and setting goals for the coming week. This structure for a typical meeting was outlined during the initial introductory session between a member of the research team, the participant and the mentor, and the participants and mentors were encouraged to continue this format to help to both establish a rapport between them, and facilitate the delivery of the intervention content. Following a discussion of the planned duration and route, mentors and participants would then take part in a walk in the local environment/park. At the end of a typical session plans were made to meet the following week/bi-weekly to progress the programme. A full list of the BCTs to be delivered in the intervention is detailed in Table 6.

Table 6: Behaviour Change Techniques (BCTs) in the 'Walk with Me' Intervention

Grouping and BCTs (expanded)	**Intervention Components (informed by the BCT Taxonomy v1)**
Goals and planning	
Goal setting (behaviour)	Peer mentors will set or agree on a goal defined in terms of the behaviour to be achieved.
Action planning	Peer mentors will prompt detailed planning of performance of the behaviour by including specific reference to include (at least one of) context, frequency, duration and intensity of physical activity. *Context may be environmental (physical or social) or internal (physical, emotional or cognitive).*
Problem Solving	Peer mentors will analyse, or prompt the person to analyse factors influencing the behaviour and generate or select strategies that include overcoming barriers and/or increasing facilitators.
Review behaviour goals	Peer mentors will review behaviour goal(s) jointly with the person and consider modifying goal(s) or behaviour change strategy in light of achievement.
Behavioural contract	Peer mentors will create a written specification of the behaviour to be performed, agreed with the person, and witnessed by another.
Feedback and monitoring	
Self-monitoring of behaviour	Peer mentors will distribute (via the research team) pedometers and step diaries to the people that they are mentoring so that they may monitor and record their physical activity behaviour(s) as part of the intervention.
Social support	
Social Support (practical)	Peer mentors will advise on, arrange or provide practical help for the performance of the behaviour.
Social Support (emotional)	Peer mentors will advise on, arrange or provide emotional social support for the performance of the behaviour.
Shaping knowledge	
Instruction on how to perform the	Peer mentors will advise or agree on how to perform the behaviour

behaviour	
Grouping and BCTs (expanded)	**Intervention Components (informed by the BCT Taxonomy v1)**
Natural consequences	
Information about health consequences	Peer mentors will provide information (e.g. written, verbal, visual) about health, consequences of performing the behaviour.
Information about social and environmental consequences	Peer mentors will provide information (e.g. written, verbal, visual) about social and environmental consequences of performing the behaviour.
Comparison of behaviour	
Demonstration of the behaviour	Peer mentors will provide an observable sample of the performance of the behaviour.
Repetition and substitution	
Behavioural rehearsal and practise	Peer mentors will prompt practice or rehearsal of the performance of the behaviour one or more times in a context or at a time when the performance may not be necessary, in order to increase habit and skill.
Habit formation	Peer mentors will prompt rehearsal and repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour.
Graded tasks	Peer mentors will set easy-to-perform tasks, making them increasingly difficult, but achievable, until behaviour is performed.
Antecedents	
Adding objects to the environment	The provision of pedometers will add objects to the environment in order to facilitate performance of the behaviour.
Restructuring of the social environment	Peer mentors will change or advise to change the social environment in order to facilitate performance of the behaviour.

The intervention began with a face-to-face meeting between the peer mentor, the participant and a member of the research team. The role of the member of the research team was to facilitate initial discussions. At this introductory meeting, the discussion focussed on building

rapport and defining the role of the peer mentor and the main behaviour change techniques of the intervention were described (e.g. goal setting, reviewing behavioural goals, problem solving). At the end of this initial meeting, the participant was given a pedometer (Yamax SW-200, Yamax Corp, Japan) and a participant information and resource booklet which contained study contact details, weekly step diaries and a physical activity action planning template. The participant and peer mentor undertook a short (five minutes) 'familiarisation' walk, during which the participant was shown how the pedometer worked and the accuracy of the device to record steps was checked. The meeting concluded with the exchange of contact details and a plan to meet the following week.

The initial period of the intervention (activation stage, weeks 1-4) was designed to enable the participant and peer mentor to establish a rapport (e.g. by building a trusting relationship that is necessary for successful peer mentoring). During the first week, the participant recorded their baseline levels of physical activity using the pedometer. Following this, initial step goals were set by the participant with the support of the mentor.[61, 62] The goal was based on the average steps/day during the first week. Participants and mentors discussed what a reasonable goal for the next week would be. The participant was encouraged to consider increasing their daily steps by 500 steps per day (approximately five minutes per day) and then the mentor and participant discussed how many more steps/day would be practical. Once a goal was decided on, the participant was asked to rate, on a 10-point Likert scale, how confident they were that they could meet this goal. If they rated their confidence as seven or less, the goal was revised downwards until they rated their confidence as eight or above. Following this, an action plan was discussed to plan how additional physical activity would be incorporated into weekly schedules, by agreeing to meet to walk with their mentor (at a minimum of once bi-weekly). This enabled the peer mentor to advise the participant of the frequency, intensity, time and type of physical activity they should be taking part in (e.g. by discussing the physical activity guidelines for older adults, copies of which were included in the participant information and resource booklet).

The programme continued (weeks 5-8) with the participant and mentor meeting regularly to walk and discuss goals/barriers to increasing physical activity. These meetings enabled the mentor to demonstrate the appropriate walking pace to achieve moderate intensity physical activity, and enabled the participant to set individual physical activity goals by taking into

consideration their capabilities. Weekly activity targets were reviewed and agreed upon. If the participant had difficulty increasing their physical activity, the mentor discussed strategies to overcome barriers to increasing physical activity (e.g., by discussing opportunities for physical activity in the local neighbourhood environment). During this period, the mentor and participant began to make plans to attend a local community based/ leisure centre based walking group or other local physical activity opportunities (to take place during week 10–12) that would help the participant maintain their activity level when the structured component of the intervention came to an end.

The final four weeks of the intervention emphasised behaviour rehearsal and practice by the participant walking regularly in a locally accessible physical activity environment (e.g. local park). In order to increase physical activity habit formation, the peer mentor prompted rehearsal and repetition of physical activity behaviour by meeting and discussing physical activity goals with the participant, via weekly/biweekly walks and contact over the telephone. The final weeks of the structured component of the intervention provided an opportunity for the participant and mentor to discuss other community based physical activity opportunities and to attend a local community group to facilitate the maintenance of physical activity behaviours at the conclusion of the 12-week intervention.

Peer mentors

Peer mentor recruitment

To assist in delivering the programme, peer mentors were recruited, prior to and concurrently with participant recruitment, through partnerships with local community organisations, leisure centres, general practices & through referral from the physical activity co-coordinator based in the Health and Social Care Trust. Posters and leaflets were used to invite individuals who lived in the target areas, were aged 60-70 years and who were already physically active, to consider participating in the study as peer mentors and to contact the research team. In addition, individuals who volunteered to take part in the intervention but were not eligible as they were already sufficiently physically active according to the current recommended level of 150 minutes per week, were invited to participate as a peer mentor.

Before being appointed as a peer mentor, these individuals attended a meeting with a member of the research team (typically at a local community venue), where they were provided with

information on the study and the role of mentors within it. During this initial meeting, potential peer mentors were asked to confirm their willingness to undergo the required training to deliver the programme and about their attitude and commitment to helping others increase their physical activity levels and to complete baseline assessment measures of their health, well-being and physical activity. This session gave the prospective mentor an opportunity to discuss their personal interests, information which was used to assist in pairing the peer mentors with participants. Peer mentors completed Access NI clearance prior to being matched with potential participants.

Matching and introducing peer mentors to participants

The information gained in the meeting between the researcher and potential peer mentor was used to build a mentor profile, identifying their activity likes/dislikes and activity habits. This profile was used to facilitate matching mentors with study participants. Mentors and participants were also matched by sex and geographic location.

A member of the research team facilitated the initial introductory meeting between the mentor and the participant and the structure for a typical meeting (see intervention description, page 73) was outlined during this meeting. Participants and mentors were encouraged to continue this format in order to support the development of a rapport between them and to facilitate delivery of the intervention content.

Peer mentor training

Peer mentors received individually delivered two one-hour face-to-face training sessions, one week apart, delivered by a member of the research team, guided by the peer mentor training and support manual developed for this intervention. The aim of these sessions was to develop their skill, knowledge and confidence to promote physical activity amongst their peers. The training included information on the role and responsibilities of the peer mentor including participant confidentiality; knowledge and education about physical activity; behavioural change techniques, including setting goals and monitoring performance and problem solving and practical approaches to overcome potential barriers to physical activity. During the training sessions mentors received information on the ‘Walk with Me’ programme, including the level of commitment required (bi-weekly meetings over a 12 week period); main tasks and requirements; information about physical activity guidelines for older adults; education

about BCTs and their role in the programme; how to model physical activity behaviours; helping their peer complete and record programme activities; and reporting on activities or providing feedback to the project team. Case studies were included within the training on each BCT, based around scenarios that the peer mentor may face such as overcoming potential barriers to increasing PA. In addition, peer mentors engaged in role play to practise the use of BCTs, such as delivering instructions for using the pedometer and setting goals.

Mentors were trained in how to build and sustain an effective mentoring relationship with a peer, as well as skills building in the areas of active listening, communication and providing social and emotional support. In addition, peer mentors received a training and support manual to promote intervention fidelity. The manual included information on the areas of the programme covered in the training sessions, and copies of all of the materials they needed to deliver the intervention. They were also given a copy of the Public Health Agency Information Leaflet 'Ageing well by being active everyday' (http://www.publichealth.hscni.net/publications/ageing-well-being-active-every-day) which contains brief information on the physical activity guidelines for older adults and brief advice for older adults on how to become more active.

Additional follow-on-support was delivered to mentors during the programme. A member of the research team met with the peer mentors three times (once per month), for one hour. This was to ensure that the mentor was still comfortable with the content of the intervention, and involved a brief review of the original training, including the techniques of goal setting and monitoring, a discussion of any issues which had arisen with participants (such as not turning up or not getting on) and the focus for the next phase of the intervention.

Ongoing support for peer mentors

During the pilot RCT, peer mentors were given open telephone access to a research team member for advice/support. They also were contacted by the project manager at least once per fortnight and asked to give an update on the programme, to identify pro-actively any problems with progress in the intervention delivery or with participant contact and engagement. During the course of the intervention, no issues were identified with participant/peer mentor contact and engagement.

Control group

After the collection of baseline data collection was complete, individuals allocated to the control group were given an information booklet on active ageing (the same booklet that was given to the intervention group). They did not receive any additional support to change their activity over the course of the research study. After the 6-month data collection point they were given the opportunity to discuss with a member of the research team the availability of local physical activity opportunities (e.g. local walking groups).

Outcome measures

Outcome measures were assessed at baseline, post-intervention (12 weeks) and 6 months after baseline. The primary outcome measure was average daily minutes of moderate and vigorous physical activity (MVPA), measured over a seven-day period using a waist-worn Actigraph GT3X+ accelerometer (Actigraph Inc, USA). Non-wear time was defined as a run of zero counts lasting more than 60 minutes. At least five valid days (including one weekend day) were required for inclusion in the analysis; a valid day was defined as a 24-hour period in which more than 600 minutes of wear time were recorded.[63] Activity counts were recorded in ten second epochs. Freedson cutpoints were applied to the data to calculate time spent in sedentary ($\leq$ 100 counts min^{-1}), light (101–1951 counts min^{-1}), moderate (1952–5724 counts min^{-1}) and vigorous ($\geq$ 5725 counts min^{-1}) physical activity per day.[64]

To explore how participants adjusted their daily physical activity routines in response to the intervention, time spent in recreational, occupational, domestic and travel related physical activity was assessed using the validated EPAQ-2 self-reported physical activity questionnaire.[65]

Secondary outcomes (*see Figure 6*) included physical and mental health and mental wellbeing using the Short-Form 12 (SF-12) Health Questionnaire,[66] the 28 item General Health Questionnaire (GHQ-28)[67] and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS).[68, 69] Health-related quality of life was assessed using the EuroQol-5D-5L questionnaire.[70] Social engagement was measured with the UCLA Loneliness Scale[71] and the Lubben Social Network Scale.[72] Physical activity and social activity self-efficacy (10-pont

Likert scale rating confidence in ability to remain physically or socially active despite circumstances such as bad weather, boredom and pain),[73] and physical activity and social activity outcome expectancies (5-point Likert scale rating likelihood of outcomes such as good health, improved appearance, reduced stress, companionship and motivation)[74] were also measured. The internal consistency for the self-efficacy and outcome expectancy scales were high (Cronbach's alpha 0.91, 0.92, 0.88 and 0.91 respectively).

Process evaluation

Based on the MRC guidance on process evaluation,[75] we used a mix of approaches. The fidelity of the delivery and receipt of the intervention was assessed through structured observation of intervention delivery by a member of the research team responsible for mentor training, semi-structured interviews and focus groups with peer mentors and participants as part of the post-intervention follow-up (*see Chapter 7*), and review of intervention records and participant diaries. A member of the research team observed all of the first meetings between the peer mentor and the participant in person. The delivery was reviewed with the peer mentor as part of ongoing training. In addition, for each peer mentor, a randomly selected further meeting between them and a participant was audio recorded to assess the content fidelity of delivery. The dose of intervention delivered was assessed by asking the peer mentors and a random sample of 12 trial participants to complete weekly checklists and record a diary of contacts. The peer mentor diary included information on the number of attempts to make contact with participants and the duration of each successful contact.

To assess if the intervention was working through the pathways proposed in the intervention logic model, changes in physical activity and social activity self-efficacy and physical activity and social activity outcome expectancies were measured. Post-intervention focus groups and semi-structured interviews (*see Chapter 7*) were used to provide context to the research by examining how potential external factors may have influenced the delivery and functioning of the intervention.

Feasibility of conducting a definitive trial

The feasibility of conducting a definitive trial, defined as the ability to recruit participants within the time frame, and retain a significant proportion of them within the trial, was assessed based on the recruitment and attrition rates and the qualitative feedback from

participants and mentors. The recruitment rate was assessed by calculating the total number recruited as a proportion of the pre-defined target of 60 participants, within the timeframe of the study. We predetermined that we would not proceed to a main RCT unless a recruitment rate of 60% or greater was achieved. Attrition was measured as the proportion of participants that did not complete outcome measures at 6 months after baseline, either because they dropped out or failed to complete outcome measures. We pre-determined that we would not proceed to a main RCT unless the attrition rate was less than 30%, calculated as the number of participants who returned data at six months as a proportion of the number who started the study.

In addition, the decision to proceed to a definitive trial would be informed by the rates of unexplained adverse events in the intervention and the peer mentors' views on feasibility of delivering the intervention, whether it could be delivered within the timeline and the sufficiency of the training and ongoing support.

Acceptability of the Intervention

The acceptability of the intervention was assessed through a post-study exit questionnaire. The questionnaire, which was similar to that used in a previous physical activity intervention,[76] required intervention group participants to rate their experience of the intervention and satisfaction with the information they received about this study.

In addition, all participants in the intervention group were invited to attend post-intervention focus groups or one-to-one semi-structured interviews (the same session described under the process evaluation), with a researcher independent of the intervention delivery, to discuss their views on the feasibility and acceptability of the intervention. Participants were asked to explore reasons for success in the intervention and challenges to increasing their physical activity. They were asked what they would change about the intervention if they were to take part again.

Peer mentors also were invited to attend separate post-intervention focus groups or one-to-one semi-structured interviews (the same session described under the process evaluation) to provide feedback on their experiences of the intervention. Topics included challenges to intervention delivery, perceived success, barriers to implementation and suggestions on how

to improve the delivery of the intervention. Primary questions related to the different BCTs employed, reviewing each in turn, considering what worked to increase engagement in walking for some individuals and what did not work for others. Control group participants were invited to attend semi-structured interviews in which they were asked to give their feedback on their involvement in this arm of the study and their motivation to become involved in the research.

Transcripts from the focus group and interviews were independently analysed using content and thematic analysis by two researchers.[50] These focus groups and interviews will further inform the development and design of a fully powered trial by enabling appropriate refinement of the intervention's components and delivery for the subsequent RCT.

Assessment of harms

Although there is a low risk of harm from walk interventions, participants were encouraged to report adverse events resulting from activity (e.g. musculoskeletal problems, shortness of breath or falls). Adverse events reported by participants were recorded on a standard proforma.[77]

Sample size

As this was a pilot study no formal sample size calculation was conducted, but it was expected that 60 participants would provide sufficient information to estimate variability in the primary outcome and inform the decision around a predicted effect size, to inform a sample size calculation for a future fully powered trial.

Measurement of the resource use associated with the intervention and associated costs

We measured costs from a public sector funder perspective. Resources were categorised according to the stage they were incurred in the process; planning and preparation for delivery (stage 1), and intervention delivery (stage 2) in keeping with other trials of public health intervention.[78-81] Resources associated with the development of the intervention (stage 0) were not included in the overall costs as they would not be incurred should the intervention be adopted into practice in the future. Details about the steps involved in developing the intervention are presented in Chapter 1 of the this report. Stage 1 costs covered recurring costs associated with the intervention materials and the delivery of peer mentor training by a

trainer. Stage 2 costs covered trainer input associated with the initial intervention meeting between trainer, peer mentor and participant, on-going meetings between trainer and peer mentors, and the provision of pedometers.

As the identification of the relevant resources occurred during study set up, the research team were able to record the resource use prospectively over the course of the trial. The trainer in the trial was a post-doctoral research fellow employed by a university. However, we envisage that if 'Walk with Me' was rolled out then the role of the research fellow would be replaced by a Health Improvement Officer (band 5). Training of mentors took place in community centres and coffee shops and no costs were associated with the training location. All mentors required criminal records checks by AccessNI and were paid expenses.

Piloting the health service use log

Although the trial was not designed to estimate cost effectiveness, participants were asked to keep a record of their use of health and social care services using a study specific log (*see* Appendix 4) over the six months study period in order to pilot the use of the tool for a future definitive trial from a health service perspective. For each participant, the quantity used of the different services was multiplied by corresponding unit cost to estimate the costs. These were then summed to calculate the total cost of health service use for each participant. Unit costs were obtained from publicly available sources and set at 2017 prices (*see* Table *7*).[78] At the end of the health service use log we asked participants to express how much they agreed / disagreed with particular statements about the log using a 5-point Likert scale. As the time horizon for the analysis was less than one year, discounting of costs was not necessary.

Table 7: Unit costs (UK £) of health service contacts

Service Use	Unit cost (£)	Source
GP visit	38	Unit costs of health and social care (2017), p.162[78]
GP phone call	15	Unit costs of health and social care (2017), p.164[78]
GP out-of-hours	94	Unit costs of health and social care (2017), p.162 11.4min consultation and 12min travel, £242 per hour[78]
GP nurse	11	Unit costs of health and social care (2017) p.160 based on 15.5mins and £42 per hour[78]
Physiotherapist	45	Unit costs of health and social care (2017),p.20[78]
Podiatrist	45	Unit costs of health and social care (2017), p.203 hospital-based professional staff. [78]
A&E visit	246	Unit costs of health and social care (2017) p.110 See, Treat, Convey[78]
Hospital clinic/ outpatient	137	Unit costs of health and social care (2017), p110 weighted average of all outpatient attendances. [78]

Statistical analysis

As this was a pilot study, statistical tests to determine the effectiveness of the intervention were not performed. Instead, the effects of the intervention were represented by point estimates. For the change in primary and secondary outcomes from baseline to each follow-up time point, 95% confidence intervals were calculated.[82] Analysis was conducted by a researcher blind to group allocations. The Office for Research Ethics Committees Northern Ireland (ORECNI) gave ethical approval for the study (REC reference number: 14/NI/1330) and the trial was registered with the ISRCTN register as ISRCTN23051918. Peer mentor recruitment commenced in July 2016. Baseline recruitment of participants commenced in December 2016, and post-intervention and 6-month follow up data were collected between March 2017 and January 2018.

Chapter 6: Pilot RCT of a peer-led walking programme to increase physical activity in inactive older adults: results

To assess the feasibility of conducting a fully-powered RCT of a peer-led walking programme in older adults, the objectives of the study were to: (1) determine the most efficient methods of recruitment to a peer-led physical activity intervention in older adults; (2) assess the resources needed for the development of a future definitive trial; (3) assess the feasibility of a trial of peer-led walking intervention in older adults in terms of rates of recruitment, retention and data completeness, the administration of outcomes and the acceptability of the intervention; (4) generate data to inform what sample size would be required in a definitive trial of a multilevel peer-led physical activity intervention, based on the variability in objective measurements of physical activity and recruitment and attrition rates; (5) measure the resource use associated with the intervention and estimate costs; and (6) pilot the use of a health and social care service use instrument and summarise the resource use and costs per group.

Objective 1: Participant and peer mentor recruitment and retention

General practices were selected to represent a range of geographical locations within the target socio-economically disadvantaged areas. Of the eleven GP surgeries which were invited to participate, nine agreed to participate and to display a poster in their waiting areas. Seven of the eleven practices also agreed to send postal invitations (400 letters were sent to eligible patients) and in another practice the GPs decided that they would invite patients verbally at a weekend clinic at which influenza vaccinations were given (20 patients were invited). These five practices also agreed to invite opportunistically patients identified as being eligible during surgeries (none were recruited).

Participant recruitment strategies also included presentations to community groups and older adults groups meeting in local libraries (n=13 group presentations) and display of flyers/posters in leisure centres (n=4 leisure centres). In addition, five community-based older adults' associations emailed their members to tell them about the study; an advert was placed in a free newspaper; and two organisations that phone older and vulnerable adults on a daily basis informed their clients about the study. Challenges and opportunities for recruiting

individuals to physical activity research studies from general practice are discussed further in chapter 8.

The peer mentors who delivered the intervention (n=13) were recruited through a mixture of local community groups (n=6), leisure centres (n=3), general practices (n=2) & through referral from the physical activity co-coordinator based in the Health and Social Care Trust (n=2).

To identify community groups to approach, we spoke to physical activity co-ordinators, searched online for groups and emailed 25 local elected representatives asking for a referral to groups in their community. In addition, we attempted to place adverts about the study in local newspapers, but this was not possible without incurring substantial cost.

Overall, from these various sources, 105 individuals (36 male, 69 female) contacted the study team and expressed an interest in participating. Of these, 56 heard about the study through a letter from their GP and a further four responded after seeing a poster or flyer in their health centre. Nineteen individuals responded to an email from a leisure centre or an association for older adults and two responded after seeing a flyer in their leisure centre. Fourteen individuals responded after attending a presentation at a community group run either in a library, leisure centre or community centre. Four individuals heard about the study from a friend or family member and further four heard about the study through the Health Trust. Finally, one heard about the study through a poster in their local library and one through an advert in a community newspaper.

In total, 50 of the 105 (48%) individuals who expressed an interest in the study were deemed eligible and entered the study. The reasons for excluding individuals are summarised in Figure 7: 27 were already physically active; 26 were too busy to commit to the intervention or not interested in participating when they received further details, and two were excluded as they were too old and were not well enough to be eligible to participate. Therefore, 50 of the pre-specified sample size of 60 participants were recruited (82%), over a 12 month period

Of the 50 individuals who participated, 26 (52%) received a letter from their GP inviting them to take part. A further fourteen (28%) took part after seeing a flyer or poster in their

health centre. Five (10%) were referred into the study by a friend, four (8%) were recruited from groups in local libraries and one (2%) was recruited by a community organisation.

Before the end of the 12-week intervention, 7 people had dropped out before the post-intervention measurements were complete (n=4 described a change in their life circumstances (e.g. an increasing care commitment for an elderly relative) where they believed that they could not commit fully to the project and withdrew; n=3 withdrew from the study due to a change in health condition/completion of a surgical procedure the cause of which was unrelated to participation in the study, resulting in a retention rate at 12 weeks of 86% (43/50). All 43 participants (n= 22 intervention & n= 21 control) who were retained in the study returned data at six months. A higher percentage of participants dropped out of the control group (19%) compared to the intervention group (12.5%), indicating that the intervention did not discourage participation.

Participant characteristics

The characteristics of participants are summarised in Tables 8 and 9 and the flow of participants through the trial is described in Figure 7.

Of the 50 participants who gave written informed consent to participate, 24 were allocated to the intervention group and 26 were allocated to the control group. At baseline, the groups were balanced in terms of activity levels and health status. The overall mean age of participants was 64.5 years at baseline. Participants were predominantly female (overall 66%). Individuals who did not complete the intervention were similar to those that completed in terms of age, health status, mental wellbeing, self-efficacy and outcome expectancy. A higher proportion of non-completers were female (n=6/7, 86%) compared to completers (n=27/43, 63%) and had higher levels of loneliness according to the UCLA loneliness scale (14.14±17.97 in non-completers compared with 10.00±12.02 on completers) and lower levels of social engagement according to the Lubben Social Network Scale (32.00±10.77 in non-completers compared with 45.44±10.30 on completers).

Figure 7: Consort flow diagram for the 'Walk with Me' Pilot RCT

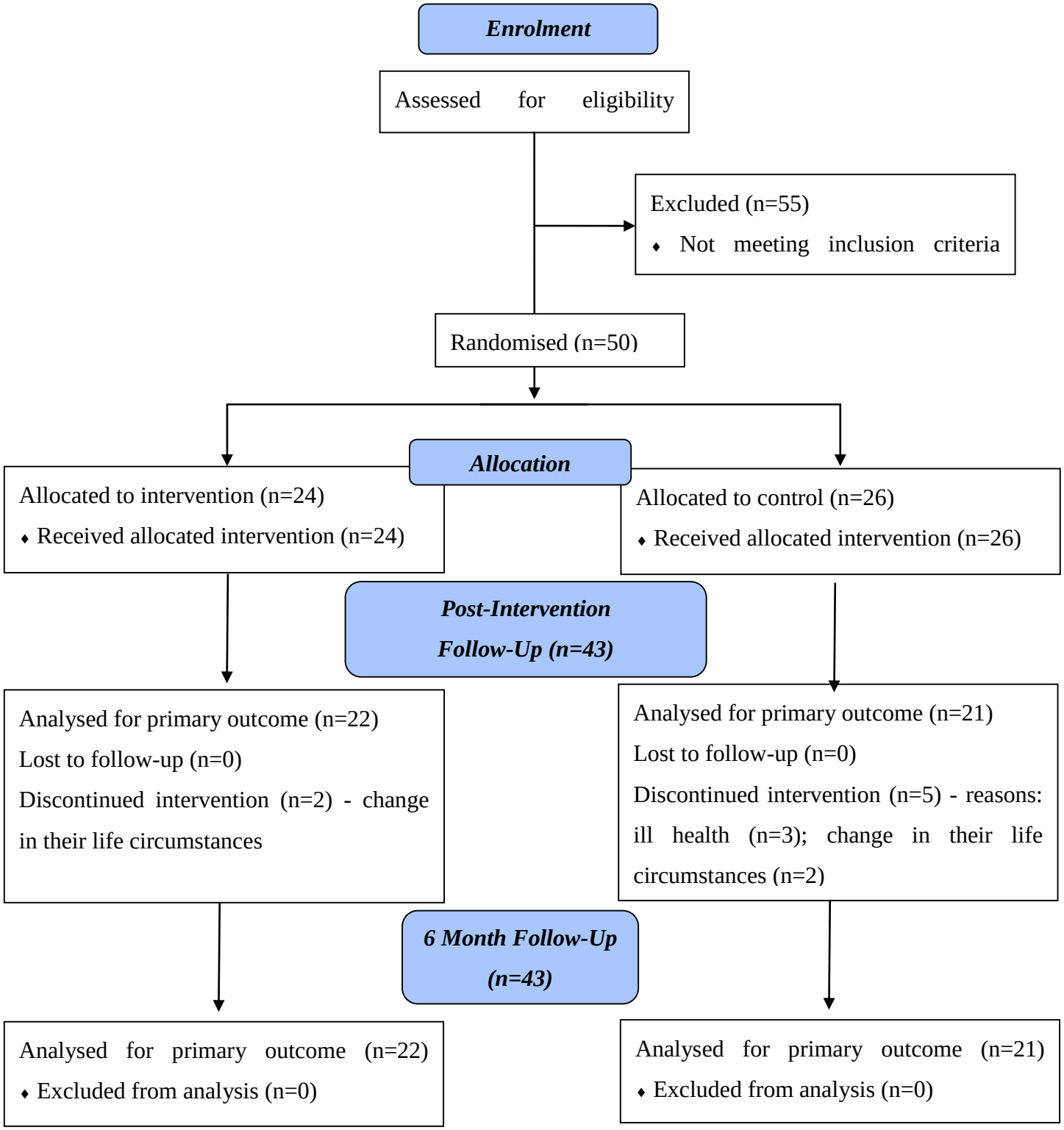


Table 8: Baseline Socio-demographic Characteristics of Participants in the 'Walk with Me' pilot RCT

	Intervention Group n=24		**Control Group n=26**		**Overall n=50**	
Outcome (units or possible range)	*N*	*%*	*N*	*%*	*N*	*%*
Sex						
Male	5	21%	12	46%	17	34%
Female	19	79%	14	54%	33	66%
Marital Status						
Married	16	67%	21	80%	37	74%
Single	2	8%	3	12%	5	10%
Widowed	6	25%	1	4%	7	14%
Separated	0	0%	1	4%	1	2%
Employment Status						
Retired	16	67%	21	80%	37	74%
Working full time	6	25%	3	12%	9	18%
Working part time	2	8%	1	4%	3	6%
Volunteer worker	0	0%	1	4%	1	2%
Car Owner						
Yes	21	88%	25	96%	46	92%
No	3	12%	1	4%	4	8%

Table 9: Baseline Characteristics of Participants in the 'Walk with Me' pilot RCT

	Intervention Group (n=24)		**Control Group (n=26)**		**Overall (n=50)**	
	Mean (SD)	*95% CI*	*Mean (SD)*	*95% CI*	*Mean (SD)*	*95% CI*
Age (years)	64.04 (-3.47)	62.58, 65.51	64.92 (3.27)	63.54, 66.3	64.48 (3.36)	63.5, 65.46
Sedentary time (mins/day)	705.5 (-196.01)	620.74, 790.27	695.22 (399.39)	526.57, 863.87	700.25 (313.3)	608.26, 792.24
Light Intensity PA (mins/day)	172.21 (47.89)	151.5, 192.92	176.75 (55.86)	153.16, 200.34	174.53 (51.6)	159.38, 189.68
Moderate Intensity PA (mins/day)	28.58 (13.56)	22.71, 34.44	34.38 (923.01)	24.67, 44.1	31.54 (19.01)	25.96, 37.12
Vigorous Intensity PA (mins/day)	0.57 (1.39)	0, 1.17	0.57 (90.94)	0.17, 0.96	0.56 (1.17)	0.22, 0.91
MVPA (mins/day)	29.15 (13.8)	23.18, 35.11	34.95 (23.44)	25.05, 44.84	32.11 (19.35)	26.43, 37.79
Steps per day[a]	5989 (1913)	5162, 6816	6693 (2587)	5601, 7786	6349 (2286)	5678, 7020
No. valid days	6.61 (0.66)	6.32, 6.89	5.96 (1)	5.54, 6.38	6.28 (0.9)	6.01, 6.54
Domestic PA (mins/day)	1167.76 (583)	886.77, 1448.76	1120.98 (846.49)	735.67, 1506.3	1143.2 (724.49)	911.5, 1374.91
Occupational PA (mins/day)	15.44 (53.99)	-9.13 40.02	12.35 (54.41)	-13.12, 37.82	13.93 (53.54)	0, 30.83
Recreational PA (mins/day)	311.17 (339.99)	122.89, 499.45	364.62 (422.46)	147.41, 581.82	339.56 (380.85)	202.25, 476.88
GHQ-28 (0-84)	15.09 (9.24)	11, 19.19	18.75 (12.81)	13.34, 24.16	17 (11.27)	13.65, 20.35
SF-12 Questionnaire - total score (12-57)	26.55 (2.52)	25.37, 27.73	26.54 (1.91)	25.73, 27.35	26.55 (2.18)	25.88. 27.21
SF12 - physical health score (6-18)	12.95 (1.23)	12.37, 13.53	12.67 (1.24)	12.14, 13.19	12.8 (1.23)	12.42, 13.17
SF12 - mental health score (6-27)	13.78 (2.04)	12.9, 14.67	13.88 (1.83)	13.1, 14.65	13.83 (1.91)	13.27, 14.39
EQ-5D Questionnaire health score (/100)	74.83 (21.78)	65.41, 84.24	72.5 (18.2)	64.81, 80.19	73.64 (19.85)	67.81. 79.47
EQ5D-5L index value (-0.59-1)	0.81 (0.23)	0.72, 0.91	0.82 (0.14)	0.77, 0.88	0.82 (0.19)	0.76, 0.87
Physical activity self-efficacy (1-10)	7.07 (1.42)	6.44, 7.7	6.11 (2)	5.22, 7	6.59 (1.78)	6.04, 7.13
Social activity self-efficacy (1-10)	7.1 (1.39)	6.48, 7.71	5.93 (1.99)	5.05, 6.81	6.51 (1.8)	5.97, 7.06
PA outcome expectancy (1-10)	4.18 (0.64)	3.9, 4.47	4.0 7 (0.57)	3.81, 4.32	4.12 (0.61)	3.94, 4.31
Social activity outcome expectancy (1-10)	4.45 (0.5)	4.21, 4.68	4.16 (0.71)	3.84, 4.47	4.3 (0.63)	4.1, 4.49
LSN scale - total (0-90)	46.15 (10.88)	41.06, 51.24	40.74 (11.49)	35.77, 45.71	43.26 (11.41)	39.75, 46.77
- family (0-30)	22.2 (4.63)	20.03, 24.37	18.83 (5.92)	16.33, 21.33	20.36 (5.57)	18.67, 22.06
- neighbours (0-30)	8.45 (6.39)	5.46, 11.44	9.35 (4.73)	7.3, 11.4	8.93 (5.51)	7.23, 10.63
- friends (0-30)	15.5 (5.72)	12.82, 18.18	12.7 (5.3)	10.4, 14.99	14 (5.61)	12.27, 15.73
UCLA Loneliness Score (0-60)	8.24 (11.75)	2.89, 13.59	12.87 (13.88)	6.87, 18.87	10.66 (12.97)	6.72, 14.6
WEMWBS (14-70)	52.74 (9.55)	48.61, 56.87	50.04 (10.29)	45.7, 54.39	51.36 (9.92)	48.45, 54.28

[a]Measured with Actigraph GT3X+ accelerometer. Abbreviations:EQ-5D =EuroQol 5 dimensions; GHQ=General Health Questionnaire; LSN=Lubben Social Network; MVPA=Moderate and Vigorous PA; PA=physical activity; SF-12=Short-Form 12; SD=Standard Deviation; WEMWBS=Warwick-Edinburgh Mental Well-being Scale

Peer mentors

Of the 23 individuals who contacted the study team expressing an interest in becoming a peer mentor, 16 (16/23, 70%) completed training. Thirteen (13/23, 57%) of these were matched to a participant and delivered the intervention, but three were not matched to a participant as there were no participants needing a peer mentor in their community. Seven individuals who expressed an interest did not undertake training (reasons varied from citing pressures due to family or other volunteering commitments).

Characteristics of the peer mentors are described in Table 10, and apart from their activity levels, they are similar to the participants.

Table 10: Characteristics of Peer Mentors

	N	*%*
Male	3	23%
Female	10	77%
	Mean (SD)	*95% CI*
Age (years)	64.31 (5.23)	61.14, 67.47
Sedentary (mins per day)	603.13 (48.45)	572.35, 633.91
Light Intensity PA (mins/day)	197.1 (36.12)	174.15, 220.05
Moderate Intensity PA (mins/day)	47.68 (25.09)	31.74, 63.63
Vigorous Intensity PA (mins/day)	1.94 (2.82)	0.14, 3.73
MVPA (mins/day)	49.62 (24.66)	33.95, 65.29
Steps per day	9157 (3445)	6967, 11346
Valid number of days wear time	6.75 (0.75)	6.27, 7.22
GHQ-28 (0-84)	9.69 (4.99)	6.68, 12.71
SF-12 Questionnaire - total score (12-57)	26.9 (2.13)	25.38, 28.42
SF12 - physical health score (6-18)	12.64 (1.36)	11.72, 13.55
SF12 - mental health score (6-27)	14.42 (1.24)	13.63, 15.2
EQ-5D Questionnaire health score (/100)	88.46 (7.47)	83.95, 92.97
EQ5D-5L index value (-0.59-1)	0.91 (0.11)	0.84, 0.97
Physical activity self-efficacy (1-10)	7.7 (1.64)	6.71, 8.69
Social activity self-efficacy (1-10)	6.88 (1.93)	5.71, 8.05
Physical activity outcome expectancy (1-10)	4.48 (0.46)	4.2, 4.75
Social activity outcome expectancy (1-10)	4.49 (0.46)	4.21, 4.76
Lubben social network scale – total (0-90)	50.08 (13.1)	41.76, 58.4
- family (0-30)	20.92 (4.44)	18.24, 23.61
- neighbours (0-30)	11.92 (5.75)	8.45, 15.4
- friends (0-30)	17.25 (5.93)	13.49, 21.01
UCLA Loneliness Score (0-60)	3.91 (3.65)	1.46, 6.36
WEMWBS (14-70)	62 (5.64)	58.59, 65.41

EQ-5D=EuroQol 5 dimensions; GHQ=General Health Questionnaire; MVPA=Moderate and Vigorous Physical Activity; PA=physical activity; SF-12=Short-Form 12; SD=Standard

Deviation; UCLA=University of California Los Angeles; WEMWBS=Warwick-Edinburgh Mental Well-being Scale

Objectives 2-3: The resources needed and feasibility of conducting a definitive trial

The results above regarding recruitment and retention indicate that support from general practice, as well as from community organizations, is key to the development of a definitive trial. Further results regarding the level of completeness of valid data returned within the various outcome measures, including the extent of changes observed, and process measures used in the pilot study are reported below.

Data completeness

A summary of the completeness of data at each time point is included in Table 11. At baseline, all participants agreed to wear the accelerometer. Of these, 48/50 (96%) participants returned valid accelerometer data at baseline. At 12 weeks, of the 43 participants still in the study, two did not return valid accelerometer data, meaning 93% (41/43) of accelerometer datasets at 12 weeks were available for analysis. Finally, at 6 months, 40 (93%) of the 43 participants who wore an accelerometer, returned valid data. Other outcomes were returned with a similar degree of completeness (*see Table 11*).

Table 11: Completeness of Data Return in the 'Walk with Me' Study

	Baseline (n=50) *n (%)*	**12 weeks (n=43)** *n (%)*	**6 months (n=43)** *n (%)*
Valid Actigraph datasets returned	48 (98%)	41 (95%)	40 (93%)
EPAQ physical activity questionnaire	41 (82%)	35 (81%)	22 (51%)
GHQ-28	46 (92%)	42 (98%)	43 (100%)
SF-12 Questionnaire			
SF12 - total score	44 (88%)	40 (93%)	36 (84%)
SF12 - physical health score	44 (88%)	40 (93%)	36 (84%)
SF12 - mental health score	47 (94%)	41 (95%)	41 (95%)
EQ-5D Questionnaire	47 (94%)	43 (100%)	42 (98%)
Physical activity self-efficacy	44 (88%)	39 (91%)	41 (95%)
Social activity self-efficacy	44 (88%)	38 (88%)	40 (93%)
Physical activity outcome expectancy	44 (88%)	43 (100%)	41 (95%)
Social activity outcome expectancy	42 (84%)	42 (98%)	41 (95%)
Lubben social network scale			
Lubben social network scale (total)	43 (86%)	42 (98%)	43 (100%)
Lubben social network scale (family)	44 (88%)	43 (100%)	43 (100%)
Lubben social network scale (neighbours)	43 (86%)	42 (98%)	43 (100%)
Lubben social network scale (friends)	43 (86%)	43 (100%)	43 (100%)
UCLA Loneliness Score	44 (82%)	39 (91%)	40 (93%)
WEMWBS	47 (94%)	43 (100%)	41 (95%)

EPAQ=EPIC Physical Activity Questionnaire; EQ-5D=EuroQol 5 dimensions; GHQ=General Health Questionnaire; SF-12=Short-Form 12;; UCLA=University of California Los Angeles; WEMWBS=Warwick-Edinburgh Mental Well-being Scale

Change in outcomes

Changes in outcome measures at 12 weeks and 6 months are reported in Table 12. The study was not powered to detect change, therefore only descriptive statistics are included. There did appear to be an increase in moderate-to-vigorous physical activity at 12 weeks and 6 months in the intervention group (7.42±10.79 mins/day & 6.30±16.60 mins/day respectively), but a

decrease in the control group (-8.02±24.41 mins/day) at 12 weeks and slight increase at 6 months (1.51±29.54 mins/day).

One individual in the control group returned to work as a postman between the end of the intervention and the six-month follow-up, and increased their average MVPA per day from 18.8 mins/day at baseline to 119.6 mins/day at six months. This accounts for the large variance in the control group at six-months. When this outlier was omitted from the analysis, the mean±SD in the control group at six months was -4.33±16.55 minutes of MVPA per day, resulting in a difference of mean change between the groups of 10.64 mins of MVPA per day

Mixed findings were found for other outcomes, with a high degree of variability (*see* Table 12). Outcomes appeared to move in a positive direction in EQ5D-5L health score and GHQ-28 score in the intervention group, but these improvements were not observed at 6 months. At 6 months, there did appear to be improvements in physical activity and social activity outcome expectancies and self-efficacy for social activities in the intervention group. No changes were observed in social isolation or loneliness.

Table 12: Changes in Outcomes at 12 Weeks and 6 Months in the 'Walk with Me' Study

	Change after 12 weeks				**Change after 6 months**			
	Intervention Group n=22		**Control Group n=21**		**Intervention Group n=22**		**Control Group n=21**	
	Mean (SD)	*95% CI*	*Mean (SD)*	*95% CI*	*Mean (SD)*	*95% CI*	*Mean (SD)*	*95% CI*
Sedentary time (mins/day)	-82.19 (226.19)	-188.05, 23.66	48.14 (149.64)	118.17, -21.9	-26.26 (328.24)	119.28, -171.79	77.54 (265.9)	209.77, -54.69
Light Intensity PA (mins/day)	3.83 (50.5)	-19.8, 27.47	-18.12 (49.26)	4.93, -41.18	-6.38 (27.06)	5.62, -18.38	-15.4 (49.81)	9.37, -40.17
Moderate Intensity PA (mins/day)	6.3 (11.4)	0.97, 11.64	-7.62 (24)	3.18, -19.68	5.6 (15.09)	12.29, -1.09	1.74 (29.23)	16.27, -12.8
Vigorous Intensity PA (mins/day)	1.11 (3.2)	-0.39, 2.61	-0.4 (0.99)	0.06, -0.87	0.71 (3.69)	2.34, -0.93	-0.23 (0.83)	0.18, -0.65
MVPA[a]	7.42 (10.79)	2.37, 12.47	-8.02 (24.41)	3.4, -19.45	6.31 (16.6)	13.66, -1.05	1.51 (29.54)	16.19, -13.18
Steps per day[b]	720 (2032)	-231, 1671	-901 (3044)	524, -2325	543 (2271)	1550, -463	133 (3702)	1974, -1708
Domestic PA (mins/day)	412.97 (721.31)	108.39, 717.56	285.41 (697.94)	567.31, 3.51	686.35 (517.67)	904.94, 467.76	620.37 (592)	859.48, 381.26
Occupations PA (mins/day)	382.75 (489.19)	176.18, 589.32	59.26 (241.9)	175.85, -57.33	582.75 (503.11)	795.19, 370.31	622.63 (503.54)	826.02, 419.25
Recreational PA (mins/day)	645.87 (517.55)	427.33, 864.41	408.08 (549.26)	629.93, 186.23	890.25 (443.76)	1077.63, 702.87	714.99 (443.15)	893.98, 536
GHQ-28	-2.1 (12.28)	-7.68, 3.49	-1.4 (10.7)	118.17, -21.9	-3.05 (11.4)	2.14, -8.23	-6.24 (13.51)	-0.09, -12.39
SF-12 Questionnaire								
SF12 - total score	-0.11 (2.23)	-1.18, 0.97	-0.05 (2.01)	0.06, -0.87	0.76 (2.95)	2.28, -0.75	0.22 (2.6)	1.52, -1.07
SF12 - physical health score	0.05 (1.47)	-0.66, 0.76	0.001 (1.17)	4.93, -41.18	0.47 (1.33)	1.15, -0.21	0.06 (1.35)	0.73, -0.62
SF12 - mental health score	-0.33 (2.03)	-1.26, 0.59	-0.05 (1.9)	3.6, -18.85	0.14 (2.61)	1.33, -1.05	0.05 (2.63)	1.32, -1.22

	Change after 12 weeks				Change after 6 months			
	Intervention Group n=22		**Control Group n=21**		**Intervention Group n=22**		**Control Group n=21**	
	Mean (SD)	*95% CI*	*Mean (SD)*	*95% CI*	*Mean (SD)*	*95% CI*	*Mean (SD)*	*95% CI*
EQ-5D Questionnaire - health score	6.91 (17.45)	-0.83, 14.65	1.95 (19.66)	3.4, -19.45	7.71 (21.6)	17.55, -2.12	6.72 (22.71)	18.02, -4.57
EQ5D-5L index value	0.06 (0.11)	0.01, 0.11	0.001 (0.22)	524.29, -2325.25	0.03 (0.1)	0.08, -0.02	0.04 (0.13)	0.1, -0.02
Physical activity self-efficacy	-0.06 (1.36)	-0.74, 0.62	-0.1 (1.35)	3.61, -6.41	0.16 (1.56)	0.91, -0.59	0.23 (2.61)	1.42, -0.95
Social activity self-efficacy	-0.33 (1.46)	-1.05, 0.4	-0.25 (1.32)	0.55, -0.55	1.35 (5.15)	3.91, -1.21	-0.38 (1.49)	0.3, -1.06
Physical activity outcome expectancy	0.09 (0.44)	-0.1, 0.29	0.0001 (0.0001)	0.84, -0.94	0.17 (0.36)	0.36, -0.02	0.06 (0.6)	0.33, -0.21
Social activity outcome expectancy	-0.0002 (0.003)	-0.001, 0.001	0.0005 (0.002)	0.89, -0.99	0.23 (0.72)	0.57, -0.12	-0.06 (0.61)	0.22, -0.33
LSN scale – total	2.05 (15.37)	-4.77, 8.86	1.74 (6.91)	5.07, -1.59	-2.5 (10.28)	2.06, -7.06	-2.8 (9.51)	1.65, -7.25
- family	1.5 (12.67)	-4.12, 7.12	1.14 (9.75)	5.58, -3.29	-3.5 (4.94)	-1.31, -5.69	-3.24 (3.78)	-1.52, -4.96
- neighbours	-0.45 (3.61)	-2.06, 1.15	1.16 (3.78)	2.98, -0.66	1.45 (4.16)	3.3, -0.39	0.9 (3.23)	2.41, -0.61
– friends	1 (3.39)	-0.51, 2.51	1.25 (4.34)	3.28, -0.78	-0.45 (6.15)	2.27, -3.18	-0.65 (5.72)	2.03, -3.33
UCLA Loneliness Score	-2.65 (9.16)	-6.93, 1.63	-1.11 (7.4)	0.001, -0.0006	-0.1 (8.22)	3.75, -3.95	-3.74 (9.62)	0.9, -8.37
WEMWBS	3.5 (9.99)	-0.93, 7.93	5.57 (10.22)	-0.02, -2.64	2.3 (9.13)	6.57, -1.97	4.71 (8.33)	8.51, 0.92

[a]Excluding the individual in the control group who returned to work as a postman, mean±SD, 95% CI change in MVPA at 12 weeks =12.30±15.60, -12.20,-19.82; and 24 weeks -4.33±16.60, -12.84, 4.18.

[b]Excluding the individual in the control group who returned to work as a postman, mean±SD, 95% CI change in steps at 12 weeks =-1450±1846, -1500,-2340; and 24 weeks -654±1646, -1501, 193.

EQ-5D=EuroQol 5 dimensions; GHQ=General Health Questionnaire; LSN=Lubben Social Network; MVPA=Moderate and Vigorous PA; PA=physical activity; SF-12=Short-Form 12; SD=Standard Deviation; WEMWBS=Warwick-Edinburgh Mental Well-being Scale

Process evaluation

All 12 participants who were selected randomly for audio recording of a meeting with their peer mentor, and their mentors, agreed that a randomly selected session delivered by the peer mentor would be audio recorded to assess the fidelity of delivery of intervention content. These conversations which lasted 30 to 45 minutes were recorded at the venue where the peer mentor met the participant, using a digital Dictaphone. However, due to a technical failure, all audio recordings were accidentally deleted from the digital Dictaphone before they were downloaded to a computer and therefore it was not possible to analyse the content. All peer mentors and intervention participants that were asked, also agreed to complete checklists (*see appendix 3*) to assess the fidelity of delivery and receipt of the intervention. All mentors and participants completed weekly step diaries for all 12 weeks (*see Table 13*). The fidelity checklists were not completed to the same extent. For the first three weeks, nine of the eleven participants completed the fidelity checklists which specified intervention components (e.g. goal setting, action planning), to identify which components had been received. From week six onwards, the rate of return of checklists was significantly less (*see Table 13*). This was a similar pattern for the fidelity checklists returned by mentors (*see Table 13*). In terms of the number of components reported as having been delivered by the mentor or reported as having been received by participants, this was high for the first 5 weeks (range 49% to 83%) but this was lower during the second half of the intervention. It was not clear from the checklists whether mentors and participants no longer kept accurate records, or if the intended intervention content was no longer being delivered by mentors. Intervention fidelity is discussed further in the results of the post-intervention qualitative interviews (*see Chapter 7*).

Table 13: Fidelity of Delivery and Receipt of Intervention Components

	Mentor (n=9)			Intervention Group (n=11)		
Week	*Step diaries returned*	*Checklists returned*	*Proportion of components delivered*	*Step diaries returned*	*Checklists returned*	*Proportion of components delivered*
1	9	6	74%	11	9	84%
2	9	7	83%	11	9	82%
3	9	8	72%	11	9	75%
4	9	5	69%	11	7	84%
5	9	5	52%	11	7	54%
6	9	4	46%	11	4	51%
7	9	4	41%	11	4	48%
8	9	4	35%	11	4	51%
9	9	4	40%	11	3	43%
10	9	4	31%	11	3	43%
11	9	4	31%	11	2	36%
12	9	4	40%	11	2	36%
Average per week	9	49%	51%	11	5	55%

Acceptability of the intervention

Participants in the intervention group were invited to give feedback at the end of the study. Of the 22 participants who were still in the study, 17 returned exit questionnaires and their responses are summarised in Table 14. Participants rated all aspects of the study positively (overall satisfaction, information received, peer mentor, pedometer). All 17 reported that they would take part again and would recommend the intervention programme to a friend. In the free text comments, participants noted the benefits in terms of establishing and maintaining an active routine. Some participants noted the possible benefit of adding walking groups to the intervention and a dislike of having to complete so much paperwork.

Table 14: Responses to Exit Questionnaire

Question	**Responses**
1. Overall were you satisfied with your involvement in the study?	Very satisfied=14 Somewhat satisfied=3 *Comments:* • Helped me establish daily routine • Helped to make activity a daily routine • Support to increase activity • Helped me become more active (x2) • I think it made me think more about exercising and being more active • Focus on 'Me' time – make activity a priority • Good guidance and good idea to use peer group • Found it very enjoyable and interesting recording daily activities • I enjoyed the outings with my mentor and found her very supportive • Enjoyed the regular walks each Tuesday – tried to be more active on my own each week • Still walking with Mentor after the programme • Enjoyed company and finding out more about my activity • Would like to have walked more with mentor towards the end
2. Were you satisfied with the advice/information you received about this study (including the participant information sheet and other information)?	Very satisfied=17 *Comments:* • All very clear (x 4) • Clearly explained • All well explained • All fine • Everything was explained fully and I received all information/help that was needed • No confusion • Clear information throughout the programme • Felt [Research Fellow] was supportive and only a phone call

	away
3. How helpful do you think it was having a peer mentor to encourage you to undertake more physical activity?	Great benefit=15 Some benefit=2
4. How helpful do you think the health promotion information in the leaflet was?	Great benefit=4 Some benefit=13
5. How helpful do you think the behavioural change tools were (e.g. goal setting, weekly planning schedule?)	Great benefit=14 Some benefit=3
6. Do you think the pedometer helped to change the amount of physical activity you did?	Yes =17
7. Would you recommend this scheme to a friend?	Yes =17
8. Would you be happy to be involved in this type of scheme again?	Yes=17
9. If we were to run this scheme again,	*Comments:* • Keep the same – enjoyed it

what features did you like and would want us to keep the same?	• Keep the same • Just the same • Enjoyed walking with [peer mentor] each week • Enjoyed it as was – helped me do additional activity on my own • Liked regular walks • Flexible activity –used the leisure centre on rainy days • Like peer group approach • Like using pedometer to track progress • Enjoyed the regular meetings- helped me to become more active early in the day which I would never have done
10. If we were to run this scheme again, what changes do you think could be made to improve it?	*Comments:* • Disliked the paperwork – took enjoyment out of programme – less/no paperwork • Perhaps some changes to the paperwork • Too much paperwork to fill in • To meet with others who were also participating in the scheme • Perhaps organise occasional walking groups • Group walking • Walk in groups? • More people becoming involved • A little long for me – 8 weeks would be great • OK as is
11. Do you have any other comments?	*Comments:* • Was happy to be involved • Very enjoyable, and for me beneficial project

Adverse Events

There were no related or unexpected serious adverse events in this study. One participant reported a minor musculoskeletal injury (sprained ankle) during the intervention. This injury occurred whilst boarding a train, and therefore was deemed to be unrelated to the intervention. After a short period of rest, the participant was able to resume, and complete the study.

Objective 4: Sample size calculation for definitive trial

Based on a mean difference in the change between groups of 4.8 mins/day of MVPA (Cohen's d = 0.29) at 6 months and a SD of 16.6, 316 participants per group would be required at 90% power and a significance level of 0.05, allowing for 20% dropout as shown in the pilot RCT. We did not identify clustering of the results by peer mentor, with no obvious pattern in the data suggesting that some peer mentors were not more effective at delivering the intervention than others. We have therefore not adjusted the sample size to account for clustering.

If the individual in the control group who returned to work as a postman is excluded from the sample size calculation, then based on a mean difference between groups of 10.6 mins of MVPA per day (Cohen's d = 0.64) and a SD of 16.6, 66 participants per group would be required at 90% power and a significance level of 0.05, allowing for 20% dropout. This effect size is similar to that found in a previous systematic review of pedometer interventions (Cohen's d = 0.68).[83]

A medium effect size (Cohen's d) of 0.5 is a conservative estimate of the anticipated effect size (approximately midway between the values presented above). This is equivalent to a difference between groups of 8.5 mins/day of MVPA at six months). Using this estimate, a sample size of 107 per group or a total sample size of 214 individuals would therefore be required for a definitive trial, at 90% power and a significance level of 0.05, allowing for 20% dropout.

Objectives 5-6: Measure the resource use associated with the intervention and pilot the use of a health and social care service use instrument

The key resources identified for the planning and preparation stage (stage 1) are presented in Table 15 along with the associated costs. The costs are based on the training of 13 peer mentors and 24 participants. The total cost to deliver the intervention was £5055 and the mean cost per participant was £211. The main driver of costs was the time input required by the trainer, amounting to five hours of contact on a one-to-one basis with each mentor, and one hour of contact with every participant and their assigned peer mentor. These costs would

be lower if peer mentors were paired with larger groups of participants as this would mean fewer peer mentors would be required and therefore fewer training sessions delivered by the trainer. Similarly, if peer mentor training was delivered to larger groups of peer mentors instead of one-to-one, fewer training sessions would be required. However, the results of this study indicated that these alternative structures are not feasible. We also explored the impact of a band 4 Health Improvement Officer delivering the training, as this would also be within the remit of their role, and the mean cost per participant reduced to £185.

Table 15: Resource Use and Associated Costs of Planning, Preparation and Delivery of the 'Walk with Me' Intervention

Resource use	**Unit cost (£)**	**Number of units**	**Total Cost (£)**
Planning and preparation for delivery			
Printing peer mentor manuals	3.16	13	41.08
Printing participant booklet	2.12	24	50.88
Physical activity information leaflets[a]	0.08	24	0.00
Yamax Pedometers	10.00	24	240.00
Trainer input: peer mentor training[b] (one-to-one training sessions for peer mentor lasting 2 hours)	36.00	26	936.00
Travel costs for the trainer to deliver peer mentor training (based on 56p per mile[c])	0.56	1180	660.58
Criminal record check for mentors (based on cost of £26 per standard check for Access NI[d])	26.00	13	338.00
Delivery of intervention			
Trainer input: initial meeting (to facilitate initial one-hour meeting between trainer, peer mentor and participant)	36.00	24	864.00
Trainer input: on-going support (three x one-hour support sessions)	36.00	39	1404.00
Peer mentor input-travel and subsistence (to meet with participants)	40.00	13	520.00
Total cost of intervention			**5054.54**
Mean cost per participant			**210.61**

Sensitivity analysis: Trainer rate per hours[e]	*184.65*

[a]These were given to all participants in both intervention and control group, so costs have not been included

[b]Band 5 Health Improvement Officer at £36 per hour (including salary oncosts and overheads). Unit costs of Health and Social Care (2017) p.159.

[c]NHS Terms and Conditions of Service Handbook. Pay and Conditions Circular (AforC) number 1/2017. Available from http://www.nhsemployers.org/employershandbook/afc_tc_of_service_handbook_fb.pdf (accessed 24/04/18)

[d]AccessNI:Criminal Record checks. Available from https://www.nidirect.gov.uk/articles/costs-and-turnaround-times. Last accessed 25/04/18

[e]Band 4 Health Improvement Officer at £29 per hour (including salary oncosts and overheads). Unit costs of Health and Social Care (2017) p.159.

Health service resource use

Table 16 shows the mean health service use per participant in the intervention and control groups. Three-quarters (76%; 38/50) of participants returned their health service use log at the 6-month follow-up; 19 in each group. In general, use of health services was low for both groups. The log required participants to tick a numbered box each time they used a service, therefore if no boxes were ticked it was assumed they had not used that service. There was no option to tick zero. Many patients recorded no service use at all (26/50; Intervention n=14, Control n=12) because they returned blank logs.

Service use was overall slightly higher in the control group. For every other service type, the mean usage and corresponding costs were higher for the control. The biggest difference in costs was due to more outpatient visits in the control group. Total costs were £68 lower for the intervention group.

Table 16: Participant Reported Health Service Use in the Last Three Months, Measured at Baseline and 6 Months

	Intervention (n=19)		**Control (n=19)**		
Health service	*Mean number of appointments*	*Mean (SD) cost (£)*	*Mean number of appointments*	*Mean (SD) cost (£)*	*Difference between groups (95% CI)*
GP visit	0.26	10.00 (27.87)	0.74	28.00 (54.98)	-18.00 (-46.68, 10.68)
GP phone call	0.05	0.78 (3.40)	0.53	7.79 (24.35)	-7.01 (-18.45, 4.43)
GP out-of-hours	0.05	4.97 (21.65)	0.11	9.93 (29.76)	-4.97 (-22.09, 12.16)
Practice nurse	0.21	2.28 (6.84)	0.32	3.43 (14.93)	-1.14 (-8.79, 6.50)
Physiotherapist	0.21	9.47 (41.29)	0.58	26.05 (78.40)	-16.58 (-57.81, 24.65)
Podiatrist	0.05	2.37 (10.32)	0	0	2.37 (-2.43, 7.17)
A&E visit	0.05	12.95 (56.44)	0	0	12.95 (-13.31, 39.21)
Hospital clinic/ outpatient	0.05	7.21 (31.43)	0.32	43.26 (91.93)	-36.05 (-81.26, 9.15)
Total Cost	**-**	**50.03 (135.63)**	**-**	**118.47 (197.52)**	**-68.44 (-179.92, 43.05)**

The results from the feedback resource use log are presented in Table 17. In general, the feedback was positive. The majority of responders agreed/strongly agreed that they were willing to complete the log (18/20) and that it was easy to use (15/20). Just over half (10/19) of respondents agreed it was easy to remember to use the log, although six people remained neutral. Only two respondents agreed that the log was burdensome.

Table 17: Participant Feedback on Health Service Use Logs

Question	**Responses**
Willing to complete log (n=20)	Strongly disagree=2 (10%)
	Disagree=0
	Neither agree nor disagree=0
	Agree=12 (60%)
	Strongly agree=6 (30%)
Found log easy to use (n=20)	Strongly disagree=2 (10%)
	Disagree=0
	Neither agree nor disagree=3 (15%)
	Agree=12 (60%)
	Strongly agree=3 (15%)
Found easy to remember to use log (n=19)	Strongly disagree=2 (10.5%)
	Disagree=1 (5.3%)
	Neither agree nor disagree=6 (31.6%)
	Agree=8 (42.1%)
	Strongly agree=2 (10.5%)
Found log burdensome (n=19)	Strongly disagree=6 (31.6%)
	Disagree=6 (31.6%)
	Neither agree nor disagree=5 (26.3%)
	Agree=2 (10.5%)
	Strongly agree=0

Chapter 7: Acceptability of a peer-led walking programme to increase physical activity in inactive older adults: 'Walk with Me' study"

Introduction

In keeping with the MRC framework for developing complex interventions[34], the 'Walk with Me' study was piloted to determine the acceptability of the programme and the feasibility of a definitive trial. The feasibility of the trial was discussed in Chapter 6; this chapter presents information on its acceptability based on the results of a qualitative evaluation undertaken with a sub sample of those who delivered and received the 'Walk with Me' programme.

Aim and objectives

This phase of the project sought to explore the acceptability of the 'Walk with Me' study. More specifically, the objectives were to: explore the acceptability of the intervention components from the perspective of those who received and delivered it; identify barriers to success and implementation; and identify possible improvements to the intervention that could be made.

Methods

Qualitative methodology involving interviews and focus groups was used to explore the acceptability of the 'Walk with Me' study, in order to identify possible changes to the intervention and proposed trial design, to improve their acceptability and the likelihood of successful delivery of a definitive randomised controlled trial. Interviews and focus groups were conducted between March 2017 and January 2018.

Participants

Peer mentors and members of the intervention and control groups who completed the study were invited to take part in a post-intervention interview or focus group. Participant characteristics are presented in Table 18.

Table 18: Characteristics of Participants in Post-Intervention Evaluation

ID	Sex	Age (years)	Employment Status
Peer Mentors			
PM1	Female	67	Retired
PM2	Female	67	Retired
PM3	Female	62	Part-time work
PM4	Female	65	Retired
PM5	Male	67	Retired
PM6	Female	64	Retired
PM7	Female	50	Retired
PM8	Female	70	Retired
Intervention Group Participants			
IP1	Female	66	Retired
IP 2	Female	62	Retired
IP 3	Male	60	Retired
IP 4	Female	61	Retired
IP 5	Female	68	Retired
IP 6	Female	68	Retired
IP 7	Female	61	Part-time work
Control Group Participants			
CP1	Male	64	Retired
CP2	Female	63	Voluntary work (part time)
CP3	Female	65	Retired

Data collection

Semi-structured focus groups and interviews were considered the most appropriate methods for eliciting views and opinions on the 'Walk with Me' study. However, it proved difficult to find a convenient time and date to form focus group discussions. Consequently, only one focus group was conducted with four peer mentors. The remaining data were collected via one to one interviews (n=14). The focus group and interviews lasted 30 to 45 minutes and were conducted in the local community or in participants' homes. They were facilitated by a female independent researcher (JD), who has completed an MSc in health psychology and has experience in implementing qualitative research methods.

At the beginning of each interview and the focus group, participants were informed of the research topic, encouraged to share their views on the study and asked to keep in mind that both positive and negative views and any recommendation on how the study could be improved would be welcomed during the discussion. Three flexible schedules were developed to guide the discussions, one for intervention participants (*see Table 19*), one for peer mentors (*see Table 20*) and one for control participants (*see Table 21*). These schedules contained questions that explored the study objectives but reflected the individual's role in the intervention. However, as a semi-structured approach was employed, participants were encouraged to discuss issues that arose but were not originally included in the schedule. Additional probing questions were also used to obtain more detailed information. All interviews and the focus group were recorded using a voice recorder. The audio files were transcribed verbatim and subjected to thematic analysis.

Table 19: Summary of Schedule for Intervention Participants

General:
How did you hear about the study?
Why did you decide to take part?
Intervention:
Tell me about your experiences as a participant in the 'Walk with Me' study?
How did you feel about completing the goal setting sheet?
How did you identify and overcome barriers that prevented you from meeting your goals?
How did you feel about recording your steps?
How did you feel about using the pedometer?
Can you tell me about your meetings with your peer mentor?
Can you tell me about the walks you attended with your peer mentor?
What did you think about the amount of contact time you had with your peer mentor?
How did you feel about completing the paperwork involved?
What part of the study did you like the best?
What part of the study did you like the least?
What would you change about the study if you were to take part again?
Closing questions:
What do you think were the benefits of taking part?

Would you take part in a similar programme again?

Table 20: Summary of Schedule for Peer Mentors

General:
How did you hear about the study?
Why did you decide to take part?
Training:
What did you think about the training you received for becoming a peer mentor?
Could the training be improved?
Intervention:
In your opinion:
How did your peers feel about setting goals?
Do you see any problems with using the goal setting to increase physical activity?
Do you see any problems with using a weekly diary to record people's steps?
How did your peers feel about developing an action plan?
What difference did using a pedometer make to their physical activity levels?
Can you tell me how your peers felt about the problem solving strategies used?
How do you feel about peer mentors being used to support people's physical activity?
What do you think about the amount of contact time you had with your mentee?
Can you explain how the paperwork in the training and support manual was used?
What aspects of the study worked best?
What aspects of the study did not work well?
Closing questions:
How could the study be improved to help peer mentors implement the programme?
If you had a chance to change the way this programme was implemented, what would you change?

Table 21: Summary of Schedule for Control Participants

General:
How did you hear about the study?
Why did you decide to take part?
Group allocation:
How did you feel about the group you were allocated to?

Can you tell me about the information leaflet you received?
What were the advantages of taking part?
What were the disadvantages of taking part?
Paperwork:
How did you feel about completing the paperwork involved with this study?
Closing questions:
Would you like to take part in a similar programme in the future, if offered to you?

Data analysis

The transcripts were analysed thematically in line with guidance provided by Braun and Clark[49]. As such, the researcher (JD) familiarised herself with the data and generated initial codes. Relevant data was assigned to these codes which were then allocated to themes that reflect the aims and objectives of this research. Themes and codes were reviewed to ensure they were clearly defined. After conducting 14 interviews and one focus group, data saturation was reached (i.e. no new information or themes were emerging from the data).

Results

This section presents our findings within two main themes. First, the acceptability of the 'Walk with Me' study, from the perspective of peer mentors, members of the intervention group and members of the control groups and second, participants' motivation to become involved in the study. Exemplar quotes are included to support these findings however, all quotations have been anonymised. Thus, the views of peer mentors (coded as PM1-8), intervention participants (coded as IP1-7) and control participants (coded as CP1-3) are labelled throughout this section.

Overall, peer mentors and members of the intervention and control groups spoke very positively about the 'Walk with Me' study. The majority described the intervention as an enjoyable experience and mentioned that they would be willing to take part in a further future study or to recommend the intervention to a friend.

PM2: *"I enjoyed the experience"*

IP5: *"I thoroughly enjoyed it I have to say, I thought it was good"*

Control participants believed that the 'Walk with Me' study could help older adults to increase their physical activity levels. In addition, the social support component of the intervention was viewed positively suggesting that peer mentors might be a key feature influencing the acceptability of the programme.

> **CP2:** *"I think especially when you reach that age group you're either, before that you're either into a mode of exercising and looking after yourself or you're not and if you're not in that mode then I think something that sort of heightens the idea that you should be I think is very good"*

> **CP2:** *"It would be worthwhile if it gets people motivated and gets people going…it's good for the social aspect too"*

Theme 1: Acceptability of the 'Walk with Me' study

Peer mentors' and intervention participants' views of the acceptability of the 'Walk with Me' study were influenced by their experiences of benefits associated with participating and barriers to success/implementation of the intervention; they suggested several possible changes to enhance its acceptability. In relation to the control group, views of acceptability were influenced by perceived benefits from participation, willingness to be randomised and suggested changes to the treatment of a control group.

Peer mentors

Peer mentors were positive about their role and felt that both they, and their peer, benefited from participating, suggesting that benefits associated with the intervention promoted positive attitudes towards the study.

> **PM8:** *"I feel that it was a two-way process and I really benefited from it as well as I was walking at times when I wouldn't normally have walked and that was good for me as well as them because I was making that extra effort"*

PM1: *"I would like to think that not only did I get her walking but just the conversations that we had when we were walking around I think was good for her mentally"*

PM5: *"It certainly reinforced my own opinion that activity is really good and it has helped me walk more you know try and get out walking every day apart from all of the gym stuff that I do"*

In general, it was agreed that the intervention was acceptable to peer mentors and that most of the components were relevant to increasing older adults' physical activity levels. Peer mentors identified peer support and self-monitoring as the most beneficial components of the intervention, suggesting that these enhanced the acceptability of the study.

PM7*: "I know this is going to sound ridiculous but I think it's the relationship they develop with you, friendships"*

PM3: *"I think the pedometer played a lot and as I said before the very simple measurement you know and you can see it day by day and week by week you can see you know the improvement"*

More specifically, peer mentors talked positively about walking with their peer, using the pedometer to monitor step counts and recording daily step counts. Peer mentors believed that these components were favoured by participants as they were enjoyable and directly contributed to their weekly physical activity and to meeting their step goals. They also found that seeing their participant increase their level of physical activity was rewarding.

PM6: *"I think probably just having someone to walk with"*

PM7: *"When they see how many steps they've done that day sometimes they were actually surprised when they were wearing it and they say oh I can't believe that today I've done...it makes a big difference, it motivates them, it encourages them most definitely"*

PM1: *"It does give them a certain amount of self-satisfaction you know to see that they're increasing their physical activity"*

Goal setting was mentioned, with more of an emphasis placed on step counts than longer term goals. This may be because meeting a step goal is a more immediate process, and longer-term goals were not specifically identified. Some expressed concern about implementing more formal components of the intervention for instance, the problem solving process and setting longer term goals, particularly as these involved completing paperwork.

PM7: *"The problem solving, people don't want it on paper, it becomes threatening you know do you understand, it makes it uncomfortable"*

Based on the discussions, it is unclear the degree to which these components were implemented in their entirety, but evidence was present that they were utilised to some extent.

PM5: *"Our plans were quite loose if you want, our main objective was to just get out once a week and for them to do what they could the other days so it was a stepping stone and I was happy to do that…I don't want to say cheating but there wasn't the full package of having to go through the whole process"*

Peer mentors spoke positively about helping people to increase their step count and felt that walking with participants was the best way to achieve this. Therefore, peer mentors were happy to arrange walks which encouraged their participant to become more active and directly contributed to their weekly step count.

PM8: *"What I would do if they said to me I want to do ten thousand steps today we went for a walk and we looked at the pedometer and if it said 9.8 then I would walk with them and finish that with them and encourage them to complete that"*

PM6: *"We just arranged it and decided we would walk for whatever distance you know and just carried on with that"*

All peer mentors mentioned that they did not like the paperwork involved with their role. Most expressed concerns about the volume of paperwork and felt that participants also disliked this aspect of the intervention. Views were based on the essential paperwork, suggesting that additional support might be required to promote more positive attitudes towards completing necessary paperwork.

> **PM2:** *"Again I just found them very repetitive I mean it was the same thing week after week so I mean there has to be a way to make it much more user friendly"*

There was consensus among peer mentors that they had received sufficient training to deliver the intervention activities required.

> **PM6:** *"I think it was sufficient, I think you know when you have life experience you really know all of this anyhow"*

However, most believed that the training and support manual was extensive and difficult to understand, suggesting it may be more user friendly if this information was condensed.

> **PM5:** *"It was explained very well but having said that if you go through the book it's slightly confusing…could've been shortened down somewhat it just didn't need to be as complicated really for somebody reading through it"*

Some peer mentors reported using the training and support manual differently throughout the study. Some indicated that they referred to the instructions to ensure they covered the necessary content each week while others admitted that they referred to this information from time to time only.

> **PM6:** *"Well I did refer to it yes, I read it all through initially and then just to keep on top of it I would, because it was broken up into different weeks and that and so you know as time went on I would've referred to those just to keep myself right"*

PM1: *"Well I did read through it but I wouldn't say I used it every week, I looked at it now and again and sort of thought well I think we're achieving what we were meant to be achieving"*

Finding a time that was suitable to meet and also the weather were reported as the main barriers to delivering the intervention. Despite this, there was a general agreement that the role of a peer mentor was easy to implement but flexibility was considered important to sustaining an effective relationship with their peer.

PM4: *"We found it sometimes hard to co-ordinate getting ourselves out together do you know, it may not have suited me whereas it suited the other girl, I found that bit hard"*

PM8: *"Because of the bad weather and it was coming up to Christmas time which is the worst time ever everybody is going mad so it was quite difficult over that Christmas period"*

In general, these barriers were overcome by rescheduling and identifying alternative forms of physical activity.

PM8: *"I suggested that they maybe go to aerobics so that if they weren't able to walk at least you could do some activity inside that is similar to walking"*

PM2: *"We just rearranged if the day didn't suit we met at least once a week to walk"*

Some peer mentors asked about the possibility of using a wrist worn pedometer, suggesting that they would be more practical.

PM3: *"I definitely would have liked a wrist one cause I think it would've stayed on you all the time except when you're in the shower"*

In addition, it was suggested that the step diary should be produced as a monthly document rather than weekly and that meeting other groups of peer mentors might be beneficial for peer mentors and participants.

> **PM7:** *"If you look at it you go week one, week two, week three, I can't see why you can't put week one, week two, week three, week four on one sheet."*

> **PM6:** *"Maybe introduce us to another group even another couple or something…just to see how they felt and maybe get some ideas from them or whatever"*

Intervention group participants

Most participants agreed that the intervention was enjoyable and beneficial. They spoke positively about the physical and psychological benefits they experienced with some reporting: a decline in cholesterol levels; a better quality of sleep; weight loss and; feeling more relaxed after having participated in this study.

> **IP5:** *"I enjoyed it because you'd have got a bit of a laugh and actually you found you were talking about things that you normally wouldn't speak about when you're in here, you know that way… I felt better and actually I think I was sleeping better too you know so but I think the weight loss was a big part of it"*

> **IP3:** *"For me, my cholesterol kind of came down"*

The majority of participants felt that peer support was a key component and indicated that walking with their peer mentor was their favourite aspect of the intervention. It was clear that participants enjoyed the social support provided by having the company of a peer mentor and felt accountable to someone which enhanced their commitment to the programme.

> **IP1:** *"Well it's easier to go walking when you have somebody else as to being on your own. I think the time goes in a lot quicker if you're walking with somebody else and not being on your own"*

IP7: *"Well I think it started off making me feel accountable to somebody which is something for me personally that I like to be accountable to someone…every now again you need a wee nudge"*

IP6: *"It made a big difference because you set aside that time, you knew you were going, you knew you were going to have a real good walk and it really was enjoyable so it definitely was great encouragement… you know and we just enjoyed each other's company so that was a real bonus"*

When asked how their peer supported them during the programme, participants rated walking with their peer mentor highly. The presence of the mentor encouraged them to not only meet their step count targets but also to achieve a higher level of intensity of walking activity.

IP6: *"I would say my walk out with the mentor is what I enjoyed most and really keeping up to my steps, making that effort to keep up to the steps"*

IP5: *"We just said that we would walk together at least once a week which we did and kept in touch with each other… you found you were walking better and you were conscious of quickening your step and not just dragging yourself along you know what I mean, you were conscious that right if you walk quicker you'll feel better rather than just dawdling along"*

Participants were also positive about goal setting and self-monitoring. Most liked these components as it provided a sense of achievement and helped them to determine whether they were increasing their physical activity.

IP5: *"Because that was your goal and when you saw you hadn't made it you thought right well I'm going to do that better the next time I'm out, I'm going to do better the next time around, I found it helpful"*

IP3: *"Cause you can actually see what your progress is, see what you've done and realize you know with a little bit more effort you can up the number pretty quicker so it's useful from that viewpoint"*

Most liked keeping a step diary as they could visually see their progress which enabled them to determine whether or not they were meeting their step goal or needed to walk more.

> **IP6:** *"I found it good, I found it encouraging, the fact that you do write something down and you're saying oh yesterday I did such and such, today I've done whatever…I did find that encouraging"*

> **IP3:** *"When you see it written down, especially when you go and take the weekly average because you're thinking oh there's a couple of days there where I didn't meet my target but then when you juggle high days, so on average you do reach your target so you know so it's a good enough wee point as well"*

One participant mentioned that they liked it when their peer mentor reviewed their progress as it encouraged them to increase their step count for the following week.

> **IP5:** *"She was checking them every week and I remember the other weeks, now I can't exactly remember the figure, say I had set myself for 4000, I had that for a couple of weeks I think and she said to me right here it's time you moved that up so it would've gone up to 5000 so she would've encouraged you to up it a wee bit and you finally made it eventually"*

During the discussions, participants were asked about developing an action plan and the problem solving process. In the context of the intervention, they identified action planning in the form of setting step goals and making arrangements to walk with the peer mentor. Participants did not, however, describe problem solving activity.

> **IP3:** *"We chatted about what we currently did and exchanged phone numbers and we would phone or text each other and agree you know we would sort of agree well that's okay we'll meet same time next week same place and then if there was any change we would text so it wasn't a formal action plan as such you know we talked it over and decided okay I want to walk solid for an hour and let's see how many steps we get up"*

In keeping with the views of peer mentors, participants disliked the paperwork, with the exception of the weekly step diary. They found it difficult to recall specific forms, most mentioned that they believed they tried to complete the paperwork but were unsure if they did it correctly, suggesting that more help might be required with this aspect of the intervention. It was also suggested that developing a smaller booklet containing the weekly step diaries would be useful.

> **IP3:** *"Some of it was cumbersome paperwork…I get impatient when I'm doing paperwork"*

> **IP7:** *"Just filling in them forms…I think when people are really so busy in life filling in forms and that can be quite monotonous plus you don't know if people really see…."*

> **IP7:** *"…possibly more in a booklet form that you could sort of put in your handbag you know you were going around with this big sheet"*

Some participants also disliked aspects of what was been asked in the pre- and post-intervention assessments.

> **IP6:** *"Some of the things you hardly know what to answer you know what I mean. Are you depressed you know all of those sort of questions no I'm not depressed you know what I mean would people tell you if they were"*

Similar to peer mentors, time constraints and the weather were reported as barriers. Motivation was also mentioned. Some participants believed that knowing their peer mentor helped them to overcome these barriers as they felt comfortable with rescheduling their walks.

> **IP6:** *"Well the only thing is on one occasion I took a really bad cold or it could've been the flu but I just wouldn't have the energy to go out so that was just on one occasion and I was on holiday one week as well…we just met the following week"*

IP1: *"Well the things we did was just mainly go walking you know if the weather was good…a few times when it was raining we went down to the mall down here and we went up and down the mall"*

IP5: *"Laziness really, once I got out walking I was grand. It was just getting out of that habit of sitting on the sofa and once you got out it was good and when you came back you felt brilliant that you had got out and you had achieved what you were looking for"*

The length of the intervention programme was acceptable to participants.

IP1: *"Twelve weeks was probably okay, an okay time to do things"*

Some participants asked about the possibility of using smart phones or wrist worn step counters instead of pedometers worn on the waist, suggesting that alternative methods of counting steps might enhance the acceptability of the intervention.

IP6: *"I must admit I'd prefer that [wrist worn monitor] to the one on the back of my trousers…a Fitbit yes because it was just so easy to look at it and think you know it's there"*

It was also suggested that, if the intervention was to run again, including incentives such as a gym membership and providing an opportunity for all those involved in the study to meet might increase motivation, help increase physical activity levels and reassure participants that their progress and experiences of the intervention are similar to others.

IP3: *"I don't know if it's feasible, I don't know what the budget is but for anybody who was interested in say going to a gym maybe provide a three month gym membership or something like that just so you can have a taster session if that's something that you like and I think I would probably go for the taster session"*

IP5: *"It would be nice sort of to do some sort of other activity every so many weeks you know as a group and do something slightly different than walking… I think you need something else put in there to keep people motivated cause that's what I need at the minute, motivation"*

IP3: *"I think to hear someone else's experience and you know what they were getting from physical activity benefits of it and to see if I could learn something new"*

Some participants mentioned they would like to continue walking with their peer mentor and felt that it might be useful for GPs to monitor whether people should be reintroduced to the intervention in the future.

IP7: *"…you can do something and be 100% behind it for a couple of weeks…just to come back and check and I think it gives you that wee thing right I'm still accountable here although you're not meeting up the same whether that's through the GP to check up and say right you're doing great or maybe we should think about getting you back into the programme"*

Control group

It was clear that those allocated to the control group believed that enrolling in the research study would help them to increase their activity levels, improve their health and provide an opportunity to meet people who live in their local area.

CP1: *"Well I thought I was going to do something and I was going to increase my physical activities and contribute maybe to the overall health"*

CP2: *"I'm retired and I don't work, I'm cut off really from society in lots of ways and I thought that this was going to be a way of connecting with other people in the area you know"*

Consequently, participants allocated to this group mentioned that that they were disappointed to be allocated to this group.

CP2: *"I was in the control group so I was a bit disappointed that I wasn't in the other group because I thought I've missed my chance to be really sort of taken by the hand and sort of helped to get into the mode of exercising or walking"*

Although these individuals were disappointed with their role in the study, one participant mentioned that being involved had prompted then to join the gym, another had joined a local walking group and the third participant remained committed to increasing their physical activity in the future but were unsure how they would achieve this.

CP1: *"Well I don't think the physical activity has increased…if I want to take part you know positively in the thing, I'll have to find out what activities would be recommended for somebody like myself or I don't know whether you decide yourself what you've to do or whether it's just recommended to you"*

Control participants' views on the length of the study were mixed and influenced by their role in the study. However, in the main, the length of the study was deemed as acceptable to increase activity levels.

CP2: *"I think that's the right amount of time I think any shorter would not be sufficient and any longer would be just too long"*

Given the above, when asked if there was anything they would like to change about this study, group allocation was mentioned: the control group participants would have preferred to have received some type of intervention. In addition, it was suggested that the diary used to record accelerometer wear time data and the questionnaires administered at the beginning and end of the study could be simplified.

CP1: *"I think the assessments were you had the tracker on and you had to put in when you took it off, I think that sheet to me was very difficult to understand…I think it's important that it's ultra-simple"*

It was also suggested that those involved in the 'Walk with Me' study, irrespective of group allocation, would benefit from being introduced to others in their local area who participated, as a way of feeling more involved.

> **CP2:** *"I would like a meeting of the people in the area who were involved in the research, just as a sort of as a rounding up of the whole research where they had people from the control group and the other group…maybe sort of mingle for half an hour or something where they could talk to whoever's there to say well you know how did you find the group and did it really make a big impact on you… it's so easy sort of to sign up for a group and sometimes you're left in the air and I think when you meet up with a person involved in the research then it feels as if you were actually involved"*

Theme 2: Factors that influenced motivation to become involved

Recruiting from local community groups and GPs were key features in promoting the uptake to this study. There were common findings across the various categories of study participants, so that the views of peer mentors, intervention and control group participants are integrated in the report below.

Recruiting from communities

The findings suggest that recruiting participants and peer mentors that were familiar to one another within a local community motivated people to become involved, indicating that the recruitment strategies adopted contributed to the overall acceptability of the study.

> **IP1:** *"XX and me are sort of just more friends like and she asked me would I do this with her"*

> **PM2:** *"I got the letter and said I was interested and my friend she agreed she wanted to do it, I didn't want to be in charge of a big group of people"*

When asked how more people could be recruited, it was suggested that people like to find out what would be involved and the benefits from others who have participated. Previous quotes

also support this finding, suggesting that older adults might be motivated by learning from others.

> **CP1:** *"The best way of advertising is word of mouth you know really if you've got people there that said to you right I really benefit from this…and says here that was really worthwhile"*

It was suggested that if the study was to run again it might be useful to base its management within local community organisations with already established groups.

> **IP5:** *"With the help of the library they can maybe extend it a wee bit more you know, different groups"*

Recruiting from GPs

The majority of participants who took part in the discussions were motivated to become involved after receiving information about this study from their GP.

> **CP2:** *"I got a letter from my doctor saying that there was going to be a study and would I be interested in taking part"*

> **IP3:** *"I got a letter from my GP practice it was round about the time I turned sixty last year and asked me if I was interested in taking part…I had recently retired from work and had decided that I wanted to get myself fitter primarily by walking, not particularly interested in going to the gym but I do like getting out walking and it seemed perfect"*

It was apparent that promoting this study through GPs increased its acceptability. Participants considered this approach as more personalised with some mentioning that they were motivated to become involved because they had been personally selected by their GP as someone who would benefit from taking part.

CP2: *"…it felt like a personal invitation and so it was as if it was sort of, not targeted at me but you know just specifically for me because it had been highlighted that I was a person who could maybe be helped by this research"*

Others indicated that receiving an invitation from their GP minimised any concerns they may have had about the legitimacy of this study.

CP3: *"You know you just knew it was genuine"*

Some peer mentors who were recruited following invitation from their GP but found to be ineligible to participate because of their level of physical activity said they were motivated to take up the role of a peer mentor because they were interested in the opportunity to walk more and to help others.

PM4: *"I just found it interesting and although I go to the exercise classes I should probably walk a bit more and this was an opportunity that was going to force me to actually go out and walk more to be quite honest so that was probably the main reason plus I liked the idea of mentoring somebody who maybe wasn't as active"*

PM3: *"It gives you a bit of a feel good thing to think that you are actually helping people, that you're encouraging them to do something that is for their benefit as well as for your own you know"*

Given this, it was apparent that GPs played a role in motivating participants to take part and aided the recruitment of peer mentors to this study. However, comments suggest that adopting this recruitment method might impact on participants' expectations, for example it was mentioned that because the letter of invitation was sent from their GP they thought there would some general health checks.

CP3: *"I thought whenever the letter came through that they would do more…tell me how my cholesterol is and how my general health is…I thought there would be more tests that way but then there wasn't, so I was kind of disappointed that way, that they didn't do physical tests…you know nobody took your weight to see if you lost weight"*

IP7: *"GPs…maybe should be checking well how did you get on with that and whether you're still being active and maybe have taken records at the start of the programme and later on then, records of blood pressure, cholesterol all those wee things and mental state of a person and the GP taking that"*

Discussion

Key findings

The results suggest that the 'Walk with Me' study was acceptable and that social support from the peer mentors, self-monitoring and the associated benefits of the intervention (e.g. increased walking; encouragement; enjoyment; physical and psychological) emerged as key features in whether participation in this programme was viewed favourably. Also, a number of issues which have the potential to impact the success and implementation of this programme in the future were identified, namely the paperwork, formal aspects of the peer mentor role and control group treatment.

The paperwork involved had a negative impact on both peer mentors' and participants' experience of this study. It was not clear how peer mentors supported their participants in completing the paperwork but peer mentors' and participants' comments suggested that some additional support might be required. Participants themselves suggested that the information required should be reduced in amount, be more user friendly and be presented in a smaller booklet format. It might also be useful to identify opportunities for peer mentors and participants to meet as a group but the timing of this would need careful consideration. Such a meeting would provide an opportunity for those involved to meet others and discuss difficulties and reinforce the importance of completing the required paperwork.

Greater clarity needs to be given to participants, from the outset, on the importance of completing the self-reported outcome measures on health and psychological well-being, as it was evident from the findings that they did not see the relevance of this information. In addition, some participants recruited from GP practices expressed an expectation that they would receive physical health check-ups as part of the intervention: this might be something to consider for future research for example, blood pressure checks or monitoring body mass

index (BMI) and the inclusion of such components in baseline assessments may provide a tangible encouragement to control group participants' continued involvement in the study.

Time and the weather emerged as potential barriers to participation in the study programme but peer mentors and participants managed these well, implementing problem solving strategies.

Conclusion

To conclude, these findings suggest that the 'Walk with Me' programme and proposed trial protocol were well received by those involved, the intervention has the potential to encourage older adults to walk more and suggested protocol changes have informed the design of a definitive trial.

Chapter 8: Recruiting participants from general practice

Introduction

Previous research has suffered from the under-recruitment of older adults into research studies. Reasons cited are that older adults may be less healthy and therefore may not meet narrow inclusion criteria or refuse to participate.[84] Physical activity studies often report low response rates to invitations to participate,[85] though the need to improve understanding of effective methods to recruit trial participants has been recognised.[86]

In the 'Walk with Me' study, recruitment via general practice accounted for approximately half of the individuals who expressed an interest in taking part in the study. However, previous research has shown that it is difficult to engage general practitioners (GPs) in research. Nevertheless, engaging GPs in research can play a key role in extending knowledge and translating new information into practice. The most common reasons given by GPs for not participating in research are a lack of time, a preference for clinical care over research, lack of skills to conduct research, and research regarded as less relevant in terms of clinical or professional value.[87, 88]

To further explore the feasibility of recruiting older adults and the barriers and opportunities of recruiting participants to a physical activity research study from general practice, we conducted qualitative interviews with participants and staff from general practice.

Methods

A purposive sample of GPs engaged in recruiting participants for the 'Walk with Me' study were invited to take part in a short face to face semi-structured interview. The aim of these semi-structured interviews was to explore the barriers to GPs' participation in recruitment of patients to physical activity research. In addition, practice managers were also invited for interview. Practice managers have direct knowledge of the running of a practice and workload of GPs and it was considered that their views would provide information about enablers and barriers to recruitment from general practice. The interviews took place in each participant's own practice. The interview schedule (*see* Supplementary Material 2) was developed after reviewing responses to a brief questionnaire returned from GPs in participating practices about their experience of recruiting to the 'Walk with Me' Study and

their views of how recruitment could be improved: responses were received from 24 GPs. Each interview was recorded and transcribed verbatim. Iterative analysis allowed further exploration of issues identified in earlier interviews. Interviews were conducted by a female trainee GP (DC) who was trained in qualitative methodology.

Further interviews were conducted with six intervention participants who had been recruited from general practices. A convenience sample of participants who had recently finished the intervention, were invited to take part, and all agreed. The purpose of these interviews was to explore patients' views on themes identified in GP interviews in relation to barriers and facilitators to recruitment. The interviews took place at a location of the interviewee's choice, including the local leisure centre, the interviewee's home and the local park (as the participant wanted the interview to coincide with their morning walking schedule). Each interview was recorded and transcribed before the next interview took place to allow iterative analysis.

Data analysis

Interview transcripts were independently analysed by two people using a thematic analysis framework approach.[50] Initial codes were identified and themes collated (DC/MT). In discussion with a third researcher (MEC) these themes were reviewed and refined, ensuring clear definition. Data saturation was achieved.

Results

Practice Demographics

Six practices agreed to participate in this aspect of study. The participating practices were multi partner with varying list sizes (*see Table 22*) and located in both urban and rural settings.

Table 22: Profile of Practices Taking Part in Interviews about Recruitment

Practice	**Location**	**No. Partners**	**Approximate list size**
A	Urban	2	4200
B	Urban	6	9800
C	Urban	6	8640

D	Rural	2	3800
E	Rural	3	5300
F	Urban	5	8755

In total four GPs, four practice managers and six participants agreed to participate in a semi-structured interview. Three of the four GPs had returned questionnaires prior to the interview. While the aim was to interview at least six GPs, data saturation was achieved with four GP and four practice manager interviews. Thematic analysis of the interviews identified themes and sub-themes, based on the views expressed by GPs, practice managers and participants on recruitment to physical activity research. These themes, (1) barriers to recruitment, (2) facilitators to research recruitment and (3) suggested approaches to recruitment, are reported below, illustrated with supporting quotations which have been anonymised with the individual's corresponding role e.g. GP1 (GP), PM1 (practice manager), P1 (participant).

Theme 1: Barriers to recruitment

Expectations of the GP-patient relationship

There was a general consensus among GPs that their patients would not expect to receive advice or information about physical activity from them. Their comments suggested that GPs were reluctant to introduce the subject and invite patients to participate in physical activity research.

> **GP2:** *"I find personally they're [patients are] not that interested. They want a tablet or something. You mention it and they're like "oh aye aye". I think smoking cessation has become a bit more socially acceptable. You start on about the usual things like weight and you get varying responses. But I don't think people expect it [mention of physical activity] really"*

However, amongst the GPs' comments, a deviant opinion was identified. One rural GP perceived that patients did expect to receive lifestyle advice from their GP and that those with cardiovascular disease relied on the GP's approval to pursue physical activities. The majority of practice managers also were of the opinion that patients would expect physical activity advice/guidance from their GP.

GP4: *"They do not want to be doing anything without their GP saying it would be advisable to do that"*

PM4: *"Every exercise programme says consult your GP before starting this programme, so I think there is an expectation there although I don't know how well GPs are educated themselves to be able to provide that education to the patients"*

In contrast to most GPs, participants' comments tended to support the latter view. They welcomed advice about physical activity being given by their GP and responded positively to receiving information about the research project. Their responses appeared to be related to their views about what they hoped to achieve from consultation with their GP, in relation to improving their overall health.

P1: *"I think they [GPs] could do with putting a line or two in there, get up and get moving"*

P3: *"I think it's good for GP practices to look at what you might call the holistic approach to people's health, not just, here's a prescription"*

Most GPs felt that patients had specific but variable expectations of what their GP could do to help and what they might accept as part of a management plan, particularly in relation to physical activity. It appeared that GPs were more prepared to discuss physical activity in detail, and to mention possible involvement in research, if patients themselves raised the issue. GPs' comments also suggested that they/colleagues had particular habits in their consultation practice and that the extent to which they would usually give lifestyle advice was known by their patients: they considered it appropriate to fulfil their patients' expectations. Interestingly, one participant had similar views to the GPs, in that there was a perception that older GPs were less ready to give lifestyle advice than those who were younger.

GP1: *"Some patients have unreachable expectations of their GP and some have no expectation of their GP. I think if someone came and asked about exercise yeah some would expect their GP to say you should be doing this that or the other"*

P5: *"I feel my parents' generation just expect the doctor to give them a tablet for every ache or pain"*

One practice manager commented on the importance of the GP promoting physical activity research because of the high regard that they are held in by their patients. GPs reported a similar view. The perceived significance of the GPs' endorsement of physical activity highlights the importance of GPs' continued involvement in recruitment to physical activity research.

PM2: *"It encourages people to be physically active, I think people will take notice from the doctor"*

GP4: *"If it comes from us it carries more likelihood of success"*

One participant commented on the importance of the invitation, to take part in physical activity research, coming from the GP but appeared to understand the constraints on their time in surgery consultations.

P6: *"I think it makes more impact if the doctor says it, but they don't have the time"*

However, several participants felt that the responsibility for maintaining health lay with themselves and, that they should not be solely reliant on the GP's influence but should have a personal motivation to improve their health. They considered that displaying information about research participation in posters and leaflets was an appropriate method of recruitment, to which people should make autonomous decisions to respond.

P4: *"You have to be your own advocate because you live with your body so you know the changes"*

P5: *"I feel I should be looking after my own health, that's my responsibility"*

Further comments illustrated how the GPs' likelihood to invite a patient to partake in research was also influenced by their perceptions of the patient's response. The quote below illustrates one GP's reluctance to invite those from whom a negative response was expected and how patients' responses were often pre-judged.

> **GP2:** *"The people who are most likely to benefit are the least likely to get involved"*

Workload

Workload was identified as a significant issue in all interviews with both GPs and practice managers citing this as a barrier to GPs recruiting participants. Most GPs found that it was difficult to complete the essential tasks of their clinical role, and that involvement in research, while it may be beneficial, was beyond their workload capabilities. Research was regarded as having less priority than issues which required immediate clinical management. Also, the nature and extent of additional work required to recruit patients had an impact on their readiness to engage in the project.

> **GP1:** *"It [research] feels like an 'add on' which is maybe not as important to clinicians"*

> **GP1:** *"…recruiting in addition to delivery of a clinical service probably feels more challenging in the current setting"*

> **PM2:** *"They're just too busy, it's their workload"*

One GP commented that the increasing complexity of patients' clinical conditions discouraged the introduction of research, as another issue, into the consultation.

> **GP3:** *"With ever increasing workloads we are trying to fit more into consultations, patients are coming with not just one problem but several problems"*

Interestingly, it was not just GPs' workload which was perceived to have an impact on recruitment. Participants felt that one of the reasons that patients may decline to participate in

physical activity research was their own workloads, in their busy day-to-day lives and their personal commitments.

P3: *"It's just other commitments, finding other things to do, even retired people"*

Time

Time was identified as a separate sub-theme to workload. It encompasses limited consultation time and GPs' difficulty in finding time to learn about a research project. All GPs who took part in the interviews felt there was insufficient time during their ten-minute consultation with a patient to appropriately identify who may be suitable for the study and provide information about it. Practice managers held a similar view.

GP3: *"It's going to take a little bit of time to explain a project to a patient so that is probably the greatest barrier that I would see"*

GP3: *"The greatest barrier has got to be time just learning about these projects and following through with it"*

GPs' comments indicated that most practices would be happy to get involved with physical activity research as long as it did not interfere with other practice work. It appeared that the pressure of time needed to complete work to achieve good standards of clinical practice and governance within the practice far outweighed any monetary incentive that could be offered to incentivise recruitment to physical activity research.

GP2: *"It's about the time, not the money"*

GP1: *"Practices will do things they have time to do and that doesn't conflict with other responsibilities"*

Participants valued GPs' involvement in recruitment but felt they did not have time for recruitment of patients to research.

P1: *"They don't have time [to involve patients on physical activity research]"*

P6: *"I think it makes more impact if the doctor says it but they don't have the time"*

Weather

The weather emerged as a barrier to recruitment to physical activity research in interviews with all groups. One GP felt that the winter months may have impacted on patients' likelihood to engage in PA, and hence did not readily offer invitations or information about the study. This view was supported by practice managers, whose comments suggested that they would expect a higher rate of recruitment during more favourable weather conditions. Participants expressed varied views regarding the impact of poor weather on engagement in physical activity research that involved walking: some considered that weather was an important factor and others thought that people should be prepared to overcome its adverse influence.

GP2: *"better time of the year, maybe Winter not the best time, launch it in May"*

PM6: *"I think a longer period of time to recruit and maybe during better weather, I think if you maybe started it in the spring time"*

P4: *"My mate says, ah sure go on pull the wellies on, the weather in Ireland does impact"*

Identification of potential participants

A further barrier to GPs' recruitment was difficulties in identifying appropriate individuals. GPs recounted difficulty remembering to invite potential participants during consultations mainly due to the time constraints and competing priorities, but also difficulty remembering the specific inclusion and exclusion criteria. Practice managers' comments confirmed the view that GPs had difficulty in remembering to recruit and attributed this to the complex content of their consultations.

GP2: *"I think it's the last thing in your head sometimes [referral to research] especially if there is paperwork involved"*

GP3: *"Remembering who is eligible for recruitment might be another barrier"*

PM2: *"I don't think GPs remember to ask patients after they have dealt with everything else"*

One practice manager cited limitations of software in their current electronic record systems to identify patients who would fulfil the inclusion criteria for the current study and be eligible for postal invitation.

PM1: *"I think it's hard to pick individuals, I don't think doctors have the resources to do it, I think in terms of our search engines on EMIS PCS [operating system in practice] that we use I think it's quite hard to do because these are sort of soft targets and you sort of need to know the patients, I think narrowing in on more specific criteria"*

Theme 2: Facilitators to research recruitment

Benefits to the practice

There was a general agreement among practice managers that research was of benefit to the practice. Their comments reflected a readiness to support physical activity research as they perceived that it has positive benefits in promoting health. Their comments also indicated how they perceived potential value for the health of their staff by supporting physical activity research. There were conflicting views among GPs about the benefits to the practice of monetary incentives to encourage research recruitment, with several reporting that a monetary payment would not make up for the increased time investment necessary. Only one GP considered that a monetary incentive to purchase equipment for the practice would be beneficial.

PM1: *"Obesity is obviously a huge problem, our diabetic clinics are increasing each month and I think anything we can to do improve their health and reduce pressure on us would help enormously"*

PM2: *"I think it's good for everyone to promote PA! Even for staff to encourage us to be physically active"*

GP1: *"if there is some sort of repayment that we could get equipment for our practice or some sort of reimbursement for the practice I think we would all sign up far quicker"*

Participants equally had positive thoughts about research and so supported the practice being involved in it. They understood the potentially beneficial outcomes of physical activity research and expressed enthusiastic views that their practice could contribute to this process.

P1: *"He told me it was research and I was delighted"*

P5: *"Research is important, how else do we know if things work"*

Benefits to the GP

Most GPs had positive perceptions about research: their difficulties in being actively engaged in their practice were attributed to the aforementioned barriers. They indicated a willingness to be involved in future research and reflected the need for researchers to highlight perceived benefits to the practice when seeking to engage them in research. They also highlighted how engagement in the research project had personal professional benefits, including reflection on the workings of their primary care team, extension of their knowledge about physical activity and positive feedback on their clinical activity in the area of health improvement.

GP1: *"you know when you have research happening in a practice, like when you take part in clinical governance, when you take part in education, it just helps you to think slightly differently about what you're doing, eh, and so I think it has a role of getting the wider GP team to think more broadly about what they are doing in terms of their daily work"*

GP1: *"I do think there is a benefit to the practice which maybe isn't immediately obvious. But in hindsight everyone will have learned something because they were involved"*

GP1: *"I think from my own experience taking part in research I learned more about the clinical area and then in turn how effective I am as a clinician to patients"*

GP2: *"anything that has a demonstrated outcome, that if you know that you're doing it its worthwhile and the patients or we benefit from it in terms of reduction of health need"*

Benefits to the Participant

Perceived benefits to their patients was a significantly positive factor in the GPs' willingness to engage in physical activity research, cited in the majority of interviews. They regarded the research project as an opportune pathway in advising patients regarding healthy lifestyles and in the first steps of chronic disease management.

GP3: *"If it's something that will benefit your patients you're more likely to take it on board, I think relevance to general practice would be quite important"*

One GP reported that patients involved in research usually receive additional time from health professionals and may learn more about their condition than they would in the course of 'usual' care. Involvement in research was also perceived to be of benefit to GPs' development of their clinical skills, with potential benefit for patients' care.

GP1: *".... individuals who take part get a bit more attention and maybe learn a bit more about their condition and I think it also has the added benefit that it educates the clinicians to some extent and improve their performance as clinicians and just through all of the training and feedback and taking part"*

Similarly, participants cited benefits of their involvement in physical activity research and plans for continued physical activity efforts, corroborating GPs' perceptions of health benefits for patients.

P3: *"My cholesterol has come down and I'm contributing it to the programme, it's a good result so it's an incentive for me to keep going with the programme"*

For the participants the benefit of companionship and the social contact that the study added to their lives was a significant benefit to them and they recognised a sense of inter-dependence with their peers involved in the study.

> **P3:** *"I think the programme is really good, especially buddying up, the peer programme, coz there is the thing about guilt"*

> **P4:** *"It was something to get me involved with other people again"*

> **P4:** *"For me the social element was as important as the walking the steps"*

Theme 3: Suggested Approaches to Recruitment

Most interviewees suggested alternative strategies that they felt may boost recruitment. These included improved methods of self-referral and using the project team or practice staff to inform potential participants about the project. It was also suggested to target specific practice events or activities for recruitment, particularly of patients who would be infrequent attenders.

Self-referral to the research project

The study relied on posters displayed in waiting and reception areas to encourage self-referral, but there was limited uptake from this method. However, the interviewees approved of self-referral methods of recruitment and suggested that potential participants could be encouraged to engage by making relevant information more visible, including it on the practice's website or using text messaging.

> **GP3:** *"Well I suppose it's always good if patients can self-refer, it's becoming more widely used for example self-referral for ante-natal, so if you can target people that perhaps you don't need the step of the GP that would help"*

> **PM1:** *"you could send out a text message and get them to self- refer, but you'd have to pay practices per message"*

One participant also suggested that they would have liked to have been able to share their invitation letter to the study with others who may have been interested and could have self-referred.

> **P4:** *"The letter looked like it was just a one person and a monitor but if it was extended to other people, like your partner or your friend then you could have got three people involved"*

'In Person' Recruitment

Interestingly 'in person' recruitment strategies, where personal invitations were given directly face-to-face to potential participants, were approved by practice managers and echoed in comments from participants but were not suggested by GPs. Whilst some participants felt the GP should be opportunistically inviting patients when they attended the surgery, practice managers perceived that staff members other than the GP could contribute at least in part to the recruitment process. One approach suggested was that of asking patients, when registering with the practice, for a consent to be contacted about future physical activity studies.

> **P3:** *"Talk to people like me when you're [I'm] in for a visit"*

> **PM3:** *"Maybe even like a promotion stall downstairs as people come in the front door, telling people about it. Passing out a few leaflets and trying to encourage people"*

> **PM2:** *"I think even while people are just sitting in the waiting areas, if you had someone there to approach them and tell them about the project, promote the project"*

> **PM2:** *"I think nurses are seeing patients with certain conditions like asthma and diabetes and they have more time to talk to them, whereas if a patient goes in to speak to the doctor, …it's time, that takes up all the time"*

Interviewees' comments indicated that whilst the GPs' involvement in issuing invitations was perceived as being important, their limited time was recognised. One participant suggested

the possibility of the GP telephoning invitations, rather than trying to make time in surgery consultations or involving other members of the practice team.

> **P2:** *"Something like a telephone call, I think from the GP because that's the initial contact with the surgery"*

Targeting Events

The issue of targeting particular events or activities within the practice for concurrent efforts to promote recruitment to research was raised on a few occasions, by GPs and practice managers. For example, taking advantage of the large volumes of people that attend the practice for flu vaccination that otherwise may not attend the practice on a regular basis.

> **GP2:** *"Maybe during busy times like flu [vaccination] seasons"*

Enhanced engagement with the practice

Enhancing promotion of the research project to all practice staff was favoured by several GP interviewees, with the aims of encouraging them to remind GPs about recruitment and of involving them directly in recruitment. The importance of personal contact between the researcher and the GPs/ practice staff was highlighted as a means of heightening interest in supporting the project. Also, various options for informing GPs about the project outside of their practice time were suggested, to reduce the impact, on their clinical workload, of time taken to learn about a project.

> **GP2:** *"I think again getting practice nurses involved and keeping at the GPs to constantly remind them"*

> **GP3:** *"It might be worth looking at those other healthcare professionals who are involved in caring for the patient"*

> **GP3:** *"Targeting educational evenings for GPs in the building. You would get about 15-20 GPs at that across the practices"*

Discussion

Summary of findings

The interviews have highlighted a number of challenges, principally the issues of workload and time constraints, to GPs' recruitment of older people to physical activity research. The limited time that GPs have to dedicate to research recruitment impacted on their willingness to engage. GPs also identified the difficulties they had in remembering to invite patients during the consultation and in identifying which patients may be appropriate to recruit to the study. Perceptions of patients' expectations of GPs' knowledge of physical activity and of patients' responses to invitations to participate in physical activity research influenced GPs' engagement in recruitment. However, positive suggestions were made for improving recruitment from general practice in further studies.

A novel finding was the impact that weather had on the willingness of GPs to invite patients: they were less likely to offer an invitation if they felt patients would be likely to decline it due to poor seasonal weather conditions. We have also identified several potential facilitators which could enhance the recruitment process including emphasis of the perceived health benefits that involvement in physical activity research could impart onto the practice and its patients. There was also an overall positive perception among GPs of the enhanced personal professional knowledge that involvement in such a study could provide.

Several participants mentioned the potential for using media, such as text messaging and the use of the practice website in promoting the study and aiding in the recruiting process. This is a potential area to improve the reach of a future definitive trial without unduly burdening the practice to publicise the study further.

There was an overall positive perception of physical activity research, but a general consensus among GPs that they would find it difficult to undertake additional tasks to their current workload. From the outset in this study the aim was to have minimal impact on the workload of GPs, however for many the thought of having any additional responsibility appeared to be a deterrent for involvement in research recruitment. This may have reflected insufficient education about the project requirements for the GPs, however it was very difficult to arrange meetings with them to discuss this due to their busy schedules. Many participants appeared enthusiastic about making a contribution to research and one GP

recognised that patients involved in research may receive additional time from health professionals.

Implications for a future definitive trial

These findings offer important insights to maximise the potential of recruiting participants from general practice. GPs' concerns about additional workload need to be addressed by ensuring that added work for GPs is minimal, in order for GPs to even consider becoming involved in recruitment to physical activity research. The majority of GPs felt that monetary incentives would not encourage their participation. However, some GPs did make the reference to how they are paid for other tasks through the Quality and Outcomes Framework. This system which rewards GPs for the quality of care they provide constitutes a significant portion of GP income and is supplemented by enhanced services payments. Perhaps if incentives were streamlined to encourage regular involvement in similar research projects, more GPs would be willing to become involved.

This study suggested that it may be possible to encourage use of alternative members of the practice team, such as nurses, to become involved in the recruitment of patients to physical activity research alongside the use of letters of invitation. This may reduce the burden of responsibility and additional workload among GPs while maintaining the use of the practice as a platform for recruitment. However, just like for GPs, unless research recruitment is a recognised part of the role of other staff, it may also be viewed by them as an "extra burden" and be challenging to implement.

One participant highlighted the potential to recruit more than one person per letter of invitation sent. Offering patients the opportunity to invite a friend or family member may enhance recruitment numbers and this approach may be developed in future work. Given the current expanding traction of social media and use of information technology, this area may be explored in greater detail in future studies to provide further community reach and greater engagement with GPs and patients.

Finally, the findings suggested that future trials should avail of the influx of patients to the GP surgery that occurs during the vaccination season and during specialty clinics. One practice did invite 20 patients verbally at a flu vaccination clinic but this did not result in any

contacts to the study. However, this may be reflective of the numbers required to be invited to obtain even a single study contact. For example, from the 400 letters sent by GPs in our study, the response rate was 14% (56/400).

Chapter 9: Discussion

The 'Walk with Me' intervention was designed to engage socio-economically disadvantaged older adults in regular physical activity. The theory- and evidence-based intervention was developed according to the MRC framework for complex interventions[34] by using a mix of evidence from previous peer-led physical activity interventions and with the input of socio-economically disadvantaged older adults. The feasibility of delivering the intervention in order to evaluate its effect within a RCT was then assessed. The pre-determined recruitment and attrition rates were reached, the intervention was delivered with a satisfactory level of fidelity in weeks 1-4, but after that was less than optimal. Participants did report high levels of acceptability of the intervention within the pilot RCT. Retention and engagement in the study were high, with high levels of compliance in wearing the accelerometers to measure the primary outcome. Increases in physical activity behaviour in response to the intervention were evidenced in both the quantitative and qualitative data, demonstrating the potential effectiveness of the 'Walk with Me' intervention.

Changes required for a main trial

The pilot trial has been a critical step in moving towards a definitive, fully powered, RCT of a peer-led physical activity intervention for older adults. Several modifications are suggested to improve the implementation and evaluation of the intervention for a main trial.

We identified that it was possible to engage older adults aged 60 to 70 years old to sign up to the trial. It should be noted that the individuals who agreed to participate were relatively healthy, and more tailoring of the recruitment process is needed in order to recruit less healthy individuals given the focus of the intervention. Though the participants were classified as inactive when registering their interest in the study, accelerometer data revealed that they were reasonably active at baseline. Participants in this study were undertaking on average 32 minutes of MVPA per day at baseline. This is higher than the average MVPA in a sample of 1,186 adults aged 60-69 years who participated in the NHANES study in USA (14.2 mins/day).[89] However, the levels of physical activity in our participants were lower than the levels of a similar cohort of 298 UK adults aged 60 to 75 years recruited to a recently reported walking intervention from general practice in England (43 mins MVPA/day).[90]

In addition, two thirds of participants were female. This is similar to the findings of a previous systematic review of recruitment to walking interventions, which identified that 70% of participants are female.[58] Additionally, most (70%) of the male participants in our study were recruited via their GP, which suggests that this may be the most feasible way to recruit male participants to the study. Foster et al[58] recommended monitoring participants' responses to recruitment approaches and using different recruitment strategies where necessary to ensure balanced recruitment. Careful monitoring of recruitment by gender would be an important aspect of a definitive trial.

Given our finding that the most efficient way to recruit participants was via GP practices, this is also likely to be the avenue to identify and recruit less healthy individuals. GPs supported the idea of recruiting patients to a physical activity trial, but the process needs to take place with minimal intrusion on the delivery of direct patient care. Using GP practices to recruit participants is becoming increasingly complex, and we have identified a variety of approaches that can be used, including synchronising recruitment efforts with other activities in the practice, such as clinics.

After indicating their interest in participating, individuals were willing to accept randomisation to either an intervention or control group, although those in the control group did express a desire for more than a waitlist condition. Future peer-led interventions could consider using an attention matched control group, like Castro et al[42] who offered nutrition support instead of physical activity, albeit this may impact on the secondary outcomes. We therefore propose adding brief nutrition advice for the control group.

The 'Walk with Me' intervention only included individuals aged 60-70 years. Some community groups gave informal feedback that this may be restrictive in terms of implementation the strategy in the real world, as their practice is to offer programmes to anyone who wishes to take them up: they would identify individuals outside this age band who would benefit from the programme and be capable of participating. There is therefore a case to be made to omitting an upper age limit from future inclusion criteria and using a measure of functional ability to identify eligible participants. We also propose removing the upper age limit for peer mentors, as participants indicated that the peer mentors' ability to

motivate and support was more important than their age for the successful delivery of the intervention.

The quality of data from the primary outcome was good, with at least 93% of participants returning a valid accelerometer dataset at any time point. This demonstrates that the outcome measure was acceptable. Some participants reported that the self-reported outcomes were burdensome and took too long to complete. This may be the reason for the relatively lower rates of completeness of self-reported outcomes at baseline. These measures thus need to be reduced in terms of their time requirement, and duplication of focus, such as avoiding the use of both GHQ-28 and SF-12 questionnaires. Also, a measure of self-reported physical activity may not be needed. The purpose of including it was to capture the domains of physical activity where changes occurred, but it may not be sensitive enough to capture changes. As identified in Chapter 7, some participants expected to receive a health check as part of the intervention. We therefore propose adding measures of blood pressure and BMI to a future study. In addition, greater efforts will be required to encourage the return of data from those who discontinue the intervention but do not withdraw from the study, including the offer of telephone interviews to collect outcome data.

In the post-intervention interviews, some participants reported that they would like to have had more support from the mentors in setting goals. Some participants felt they were left to set their own goals in the later parts of the programme, though this was not corroborated by the fidelity checklists. It will be important to emphasise the importance of following the approach to goal setting set out in the programme manual with mentors in the ongoing support that is offered.

Assessment of fidelity and record keeping proved challenging within the intervention. This may be because peer mentors and participants are not professionals and therefore not used to the type of record-keeping which has worked well in previous walking programmes in clinical settings.[61] The importance of record keeping will need to be emphasised with peer mentors and participants. Some modifications, with user input, to checklists to reduce the burden of record keeping should be planned before undertaking a definitive trial. Other options will need to be explored, including mobile apps or websites to make recording

information less burdensome. In addition, a protocol for creating regular backups of digital audio recordings will prevent the loss of data.

We propose amending the exclusion criteria to exclude those not in work at the start of the intervention, but planning on returning to work before the end of follow-up. This would avoid the situation that arose in our pilot study, whereby a participant in the control group returned to work as a postman over the course of the study, thereby increasing the group's average step count through work-related activity which could not be directly attributable to the intervention.

As described in our post-intervention interviews, the burden of paperwork was a barrier to the delivery of the programme and potentially to the development of the relationship between the peer mentor and participant. Reducing the volume of paperwork should help to foster good peer mentor-participant relationships.

During training, peer mentors were advised that if they encountered difficulties in their relationship with a participant they should contact a member of the research team as soon as possible. In this scenario, the researcher would speak with both parties in an attempt to resolve issues. However, during the intervention we did not experience any difficulties in the relationship between peer mentors and participants.

Peer mentors reported that finding a time that was mutually suitable for them and participants to meet and also the weather were the main barriers to delivering the intervention (Chapter 7). Therefore, some training needs to be added to reinforce the importance of a flexible approach to working with participants and finding alternative venues, such as local shopping centres, to walk when the weather is poor. This may be achieved through a top-up training session with peer mentor (delivered at the half-way point of the intervention), which may help to refresh training on the delivery of key intervention BCTs.

Assessment of intervention costs

The intervention cost £210.61 per participant. This included the cost of training the peer mentor, the pedometer and materials. The peer mentors volunteered their time to deliver the intervention, so the cost of their time has not been included.

Piloting health service use log

The main aim of including an economic component was to pilot the use of a health and social care services resource use instrument to capture health care utilisation. Participants in both the intervention and control groups were given the template log and asked to record their use of health and social services over the full six-month period. Though we got a reasonable return of this at six months (76%), participants commented that it was burdensome to complete alongside the diaries that were used as part of the intervention. We therefore propose a modified and shortened version of this log for participants to use during the intervention, supplemented with a questionnaire at the end of the trial. We will also ensure that questionnaire adequately records when a participant has not used a service. In our rapid review of literature (*see chapter 2*), we did not identify any previous studies assessing the cost-effectiveness of a peer-led walking intervention. This emphasises the importance of including a health economic analysis in a definitive trial.

Strategic planning

Findings from the interviews conducted with peer mentors and participants following the pilot RCT suggested that recruiting peer mentors within target communities and matching them to participants within these communities motivated both the mentors and the participants to become involved in the study, indicating that the recruitment strategies that were adopted in this study contributed to the overall acceptability of the study. There was consensus among peer mentors that they had received sufficient training to deliver the intervention activities required. However, most believed that the training and support manual was extensive and difficult to understand, suggesting it may be more user-friendly if this information was condensed. Peer mentors reported using the training and support manual differently throughout the study: some indicated that they referred to the instructions to ensure they covered the necessary content each week while others admitted that they referred to this information from time to time only. This suggests that some mentors may need more support than others.

In the interviews conducted during the development of the intervention, participants identified that having a peer mentor to try new activities with would help overcome barriers and motivate behaviour change. However, matching to a peer mentor who is both physically

active and someone with whom they could develop a friendship were considered important. This was supported by the findings from the post-intervention interviews. Participants in the pilot RCT were very positive about the benefits of the support and friendship received from the mentors. They did express a desire to meet others in the programme for support during the intervention.

Although we originally planned to involve a smaller number of peer mentors, matched to groups of participants, this was not what happened in the trial. Instead peer mentors were matched with just one or two participants. This was feasible as we were able to recruit mentors from individuals who volunteered to take part in the trial, but were ineligible to do so as study participants, as they were too active. The planning of peer mentor matching will need to be addressed in a full trial. Our findings are currently inconclusive regarding how quickly a peer mentor would be willing to engage with more than one participant, so it is not clear how many peer mentors would be willing to be paired with a second and subsequent participant within the time confines of a definitive trial. In addition, we did not identify clustering of the results by peer mentor, with no obvious pattern in the data suggesting that some peer mentors were more effective at delivering the intervention than others. We have therefore not included this in the proposed sample size for a fully powered trial.

Finally, it proved very difficult to integrate the management of peer mentors into existing volunteer structures in the Health and Social Care Trust within the scope of our pilot study. Some mentors were therefore managed through the university. This is manageable within the confines of a trial, though for the longer-term implementation of the programme their management through existing walk leader schemes would appear to be the most appropriate route.

Strengths and limitations

In the section above (changes required for a main trial) we have noted the lessons learnt from the current pilot study. In addition to these, there are a few additional points that should be noted.

Characteristics of the Sample

The final sample were all living in socio-economically disadvantaged areas. However, they were more active, healthier and more likely to be female than originally envisaged. We also under recruited according to our planned sample size of 60 participants. However, we still recruited enough participants to deem a definitive trial feasible according to our original criteria. This may limit the generalisability of the feasibility of the trial to these groups. In addition, we did not record information on co-morbidities at baseline.

Recruiting more active individuals into studies is common in physical activity studies. More research is required to understand why less active individuals do not respond to invitations to participate in physical activity interventions. In addition, the sample was restricted to those aged 60-70 years. The advice of community groups was to remove the upper age limit. Along with the further engagement with GPs, removing the upper age limit may also lead to the inclusion of less healthy and less active participants.

Use of the Pedometer to set goals and monitor progress

Participants reported that they found the pedometer a useful aid to setting goals and monitoring progress. Given that all participants returned weekly step diaries throughout the full 12 weeks of the intervention, we assume that there was very high compliance with wearing the devices. In the interviews after the pilot RCT, participants re-iterated the need for pedometers to be simple to use and easy to see.

Measurement of outcomes

The use of accelerometers as an objective measure of physical activity is a key strength of this study. In the rapid review (*see Chapter 2*), only one previous trial used an objective measure.[48] In addition, compliance with the monitor is very high, suggesting high acceptability of the main outcome. As this was a pilot study, the sample size was small and, as the participants were relatively healthy, it was not unexpected that their self-reported health outcomes did not change considerably in the trial. Nonetheless, the use of both the GHQ-28 and SF-12 questionnaires as measures of general health was overly burdensome on participants.

For pragmatic reasons, the final follow-up time-point was completed three months after the end of the intervention (six months after baseline). To ascertain if changes in physical activity

are maintained over a longer period (>12 months), an additional time-point may need to be included in a fully powered definitive trial.

Process Evaluation

The loss of audio recordings to assess the fidelity of intervention delivery was unfortunate, and limited the analyses that could be performed on fidelity to the checklists and the post-intervention interviews with mentors and participants. However, fidelity was measured in a number of other ways. Analysing data from the participant and peer mentor checklists and step diaries indicated that the intervention was delivered with acceptable fidelity, suggesting that the loss of the audio recordings was not a significant limitation to the process evaluation.

Public involvement

Another strength of this study was the contribution of project partners and stakeholder representatives, who were proactive in providing guidance from their own public representatives. Through interviews, we sought the views of older adults in developing the intervention, and the design was based on their views. Subsequently, study documentation, such as the peer mentor training and support manual and the participant information booklet were read and revised by members of an older adults forum to ensure the language and content was acceptable to the target population. This provided a valuable source of public involvement during the development phase of the intervention. Service users were also involved in delivering the intervention, in their role as peer mentors. Finally, two members of the public sat on the project steering committee and provided valuable advice on recruiting to, and maintaining the involvement of older adults in the intervention.

Use of behaviour change theory and BCTs

A previous review of physical activity interventions in socio-economically disadvantaged communities[91] has shown that interventions based on behaviour change theory are more effective, though no single theory appeared to be more effective than others. Behaviour change theories provide hypothesised mechanism of intervention effects on desired outcomes.[92] Based on the findings from the systematic review (*see chapter 2*) and intervention development interviews (*see chapter 3*) we identified SCT as an appropriate theoretical framework for the design of the intervention. Interventions targeting constructs of SCT in physical activity interventions are effective at increasing motivation, and ultimately

increasing physical activity.[93] In a systematic review of interventions to increase motivation for physical activity, Knittle et al identified that motivation for behaviour change was a result of fostering of personal control over behaviour within interventions based on SCT, and this was shown to be achieved in previous interventions using BCTs such as goal setting, action planning, self-monitoring of behaviour, feedback on behaviour and problem solving.[93]

Conclusions

There is a paucity of evidence of the effects of peer led walking programmes in older adults. The 'Walk with Me' intervention, developed from existing evidence, with input from community stakeholders, based on social cognitive theory and designed with the aim of promoting physical activity among older physically inactive adults in a socio-economically disadvantaged population, was acceptable to participants. Our pilot study has informed approaches to recruitment and peer-mentoring planning for future work. Notably, participants reported that they valued recruitment via their GP, as this is someone they trust and would have confidence in their recommendation to participate. A need to reduce the burden of self-reported outcomes and address intervention fidelity in the later stages of the intervention was identified. This should be balanced against participants' desires to have objective health measures, such as blood pressure and BMI included. Quantitative and qualitative information suggested that it would be feasible to conduct a definitive randomised controlled trial to evaluate the intervention.

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All data requests should be submitted to the corresponding author for consideration. Access to anonymised data may be granted following review.

Contributions of authors

All authors read, commented and agreed the final draft report.

Mark Tully (Professor of Public Health) was the Chief Investigator of the project and took overall responsibility for the delivery of the project and writing of the report.
Conor Cunningham (Project Manager) project managed the study and co-drafted the report.
Ashlene Wright (PhD Student) contributed to the conduct and analysis of the rapid review.
Ilona McMullan (Research Assistant) completed the intervention development interviews, co-analysed the data and co-wrote the relevant chapter of the report.
Julie Doherty (Research Assistant) completed the post-intervention qualitative investigation, co-analysed the data and co-wrote the relevant chapter of the report.
Debbie Collins (GP Trainee & Masters in Research Student) completed the interviews about recruitment, co-analysed the data and co-wrote the relevant chapter of the report.
Catrine Tudor-Locke (Professor of Kinesiology) contributed to the design of the peer-led intervention, the conduct of the trial and was a member of the project management group.

Joanne Morgan (Director of Community Development and Health Network) contributed to the development of recruitment methods, the conduct of the trial and was a member of the project management group.

Glenn Phair (Junior Health Economist) co-analysed the health economics data and was a member of the project management group.

Bob Laventure (Director of Later Life Training) advised on tailoring the intervention to older adults and was a member of the project management group.

Ellen Simpson supervised the collection of qualitative data, co-analysed the data and co-authored the relevant chapters, contributed to the conduct of the trial and was a member of the project management group.

Suzanne McDonough (Professor of Health and Rehabilitation) contributed to the design of the project, the assessment of fidelity of the intervention, the conduct of the trial and was a member of the project management group.

Evie Gardner (Head of Statistics) contributed to the design of the project, supervised the statistical component of the research and was a member of the project management group.

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Margaret Cupples (Emeritus Professor of General Practice) contributed to the design and conduct of the project, co-analysed the qualitative data and was a member of the project management group.

References

1. Office for National Statistics. *National Population Projections: 2016-based statistical bulletin*. 2017. URL: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2016basedstatisticalbulletin (Accessed 06 Feb 2018).

2. Northern Ireland Statistics and Research Agency. *2016-based Population Projections for Northern Ireland*. 2017. URL: https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/2016-based%20Population%20Projections%20-%20statistical%20bulletin.pdf (Accessed 06 Jan 2018).

3. Payette H, Gueye NR, Gaudreau P, Morais JA, Shatenstein B, Gray-Donald K. Trajectories of physical function decline and psychological functioning: the Quebec longitudinal study on nutrition and successful aging (NuAge). *J Gerontol B Psychol Sci Soc Sci* 2011;**66 Suppl 1**:i82-90.

4. Paterson DH, Warburton DE. Physical activity and functional limitations in older adults: a systematic review related to Canada's Physical Activity Guidelines. *Int J Behav Nutr Phys Act* 2010;**7**:38.

5. Talbot LA, Morrell CH, Metter EJ, Fleg JL. Comparison of cardiorespiratory fitness versus leisure time physical activity as predictors of coronary events in men aged < or = 65 years and > 65 years. *Am J Cardiol* 2002;**89**:1187-92.

6. Pan XR, Li GW, Hu YH, Wang JX, Yang WY, An ZX, *et al.* Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and Diabetes Study. *Diabetes Care* 1997;**20**:537-44.

7. Manas A, Del Pozo-Cruz B, Garcia-Garcia FJ, Guadalupe-Grau A, Ara I. Role of objectively measured sedentary behaviour in physical performance, frailty and mortality among older adults: A short systematic review. *Eur J Sport Sci* 2017;**17**:940-53.

8. Bamia C, Orfanos P, Juerges H, Schottker B, Brenner H, Lorbeer R, *et al.* Self-rated health and all-cause and cause-specific mortality of older adults: Individual data meta-analysis of prospective cohort studies in the CHANCES Consortium. *Maturitas* 2017;**103**:37-44.

9. Howe TE, Rochester L, Neil F, Skelton DA, Ballinger C. Exercise for improving balance in older people. *Cochrane Database Syst Rev* 2011;**11**:CD004963.

10. Sherrington C, Michaleff ZA, Fairhall N, Paul SS, Tiedemann A, Whitney J, *et al.* Exercise to prevent falls in older adults: an updated systematic review and meta-analysis. *Br J Sports Med* 2017;**51**:1750-8.

11. Steffl M, Bohannon RW, Sontakova L, Tufano JJ, Shiells K, Holmerova I. Relationship between sarcopenia and physical activity in older people: a systematic review and meta-analysis. *Clin Interv Aging* 2017;**12**:835-45.

12. Blondell SJ, Hammersley-Mather R, Veerman JL. Does physical activity prevent cognitive decline and dementia?: A systematic review and meta-analysis of longitudinal studies. *BMC Public Health* 2014;**14**:510.

13. Elavsky S, McAuley E, Motl RW, Konopack JF, Marquez DX, Hu L, *et al.* Physical activity enhances long-term quality of life in older adults: efficacy, esteem, and affective influences. *Ann Behav Med* 2005;**30**:138-45.

14. Sari N. Exercise, physical activity and healthcare utilization: A review of literature for older adults. *Maturitas* 2011;**70**:285-9.

15. Shankar A, McMunn A, Banks J, Steptoe A. Loneliness, social isolation, and behavioral and biological health indicators in older adults. *Health Psychol* 2011;**30**:377-85.

16. Robins LM, Hill KD, Finch CF, Clemson L, Haines T. The association between physical activity and social isolation in community-dwelling older adults. *Aging Ment Health* 2018;**22**:175-82.

17. Dept of Health. Start active, stay active: a report on physical activity from the four home countries' Chief Medical Officers. London: Department of Health and Social Care; 2011.

18. Cruise SM, Hughes J, Bennett K, Kouvonen A, Kee F. The Impact of Risk Factors for Coronary Heart Disease on Related Disability in Older Irish Adults [published online ahead of print August 1 2017]. *J Aging Health* 2017.

19. Scarborough P, Bhatnagar P, Wickramasinghe KK, Allender S, Foster C, Rayner M. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006-07 NHS costs. *J Public Health (Oxf)* 2011;**33**:527-35.

20. Hobbs N, Godfrey A, Lara J, Errington L, Meyer TD, Rochester L, *et al.* Are behavioral interventions effective in increasing physical activity at 12 to 36 months in adults aged 55 to 70 years? A systematic review and meta-analysis. *BMC Med* 2013;**11**:75.

21. Taylor AHC, Cable NT, Faulkner G, Hillsdon M, Narici M, van der Bij AK. Physical activity and older adults: a review of health benefits and the effectiveness of interventions. *J Sports Sci* 2004;**22**:703-25.

22. van der Bij AK, Laurant MG, Wensing M. Effectiveness of physical activity interventions for older adults: a review. *Am J Prev Med* 2002;**22**:120-33.

23. King AC. Interventions to promote physical activity by older adults. *J Gerontol A Biol Sci Med Sci* 2001;**56 (2)**:36-46.

24. Schutzer KA, Graves BS. Barriers and motivations to exercise in older adults. *Prev Med* 2004;**39**:1056-61.

25. Costello E, Kafchinski M, Vrazel J, Sullivan P. Motivators, barriers, and beliefs regarding physical activity in an older adult population. *J Geriatr Phys Ther* 2011;**34**:138-47.

26. Devereux-Fitzgerald A, Powell R, Dewhurst A, French DP. The acceptability of physical activity interventions to older adults: A systematic review and meta-synthesis. *Soc Sci Med* 2016;**158**:14-23.

27. Carlson JA, Sallis JF, Conway TL, Saelens BE, Frank LD, Kerr J, *et al.* Interactions between psychosocial and built environment factors in explaining older adults' physical activity. *Prev Med* 2012;**54**:68-73.

28. Rosenberg DE. Outcomes of a multilevel walking intervention for older adults living in retirement communities. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 2011;**71**:5143.

29. Webel AR, Okonsky J, Trompeta J, Holzemer WL. A systematic review of the effectiveness of peer-based interventions on health-related behaviors in adults. *Am J Public Health* 2010;**100**:247-53.

30. Best KL, Miller WC, Eng JJ, Routhier F. Systematic Review and Meta-Analysis of Peer-Led Self-Management Programs for Increasing Physical Activity. *Int J Behav Med* 2016;**23**:527-38.

31. Dorgo S, Robinson KM, Bader J. The effectiveness of a peer-mentored older adult fitness program on perceived physical, mental, and social function. *J Am Acad Nurse Pract* 2009;**21**:116-22.

32. Ginis KA, Nigg CR, Smith AL. Peer-delivered physical activity interventions: an overlooked opportunity for physical activity promotion. *Transl Behav Med* 2013;**3**:434-43.

33. Dennis CL. Peer support within a health care context: a concept analysis. *Int J Nurs Stud* 2003;**40**:321-32.

34. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M, *et al.* Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* 2008;**337**:a1655.

35. Michie S, Abraham C, Eccles MP, Francis JJ, Hardeman W, Johnston M. Strengthening evaluation and implementation by specifying components of behaviour change interventions: a study protocol. *Implement Sci* 2011;**6**:10.

36. Khangura S, Konnyu K, Cushman R, Grimshaw J, Moher D. Evidence summaries: the evolution of a rapid review approach. *Syst Rev* 2012;**1**:10.

37. Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W, *et al.* The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann Behav Med* 2013;**46**:81-95.

38. Michie S, Abraham C, Whittington C, McAteer J, Gupta S. Effective techniques in healthy eating and physical activity interventions: a meta-regression. *Health Psychol* 2009;**28**:690-701.

39. Baker PR, Francis DP, Soares J, Weightman AL, Foster C. Community wide interventions for increasing physical activity. *Cochrane Database Syst Rev* 2011; **1**:CD008366

40. Boyle J, Mattern CO, Lassiter JW, Ritzler JA. Peer 2 peer: efficacy of a course-based peer education intervention to increase physical activity among college students. *J Am Coll Health* 2011;**59**:519-29.

41. Buman MP, Giacobbi PR, Jr., Dzierzewski JM, Aiken Morgan A, McCrae CS, Roberts BL, *et al.* Peer volunteers improve long-term maintenance of physical activity with older adults: a randomized controlled trial. *Journal of Physical Activity & Health* 2011;**8 Suppl 2**:S257-66.

42. Castro CM, Pruitt LA, Buman MP, King AC. Physical activity program delivery by professionals versus volunteers: the TEAM randomized trial. *Health Psychol* 2011;**30**:285-94.

43. Lamb SE, Bartlett HP, Ashley A, Bird W. Can lay-led walking programmes increase physical activity in middle aged adults? A randomised controlled trial. *J Epidemiol Community Health* 2002;**56**:246-52.

44. Parent N, Fortin F. A randomized, controlled trial of vicarious experience through peer support for male first-time cardiac surgery patients: impact on anxiety, self-efficacy expectation, and self-reported activity. *Heart Lung* 2000;**29**:389-400.

45. Pinto BM, Stein K, Dunsiger S. Peers promoting physical activity among breast cancer survivors: A randomized controlled trial. *Health Psychol* 2015;**34**:463-72.

46. Resnick B, Luisi D, Vogel A. Testing the Senior Exercise Self-efficacy Project (SESEP) for use with urban dwelling minority older adults. *Public Health Nurs* 2008;**25**:221-34.

47. Thomas GN, Macfarlane DJ, Guo B, Cheung BM, McGhee SM, Chou KL, *et al.* Health promotion in older Chinese: a 12-month cluster randomized controlled trial of pedometry and "peer support". *Med Sci Sports Exerc* 2012;**44**:1157-66.

48. Tudor-Locke C, Lauzon N, Myers AM, Bell RC, Chan CB, McCargar L, *et al.* Effectiveness of the First step Program delivered by professionals versus peers. *J Phys Act Health* 2009;**6**:456-62.

49. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res* 2005;**15**:1277-88.

50. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;**3**:77-101.

51. Finfgeld-Connett D. Use of content analysis to conduct knowledge-building and theory-generating qualitative systematic reviews. *Qualitative Research* 2014;**14**:341-52.

52. Hardcastle S, Taylor A. Looking for more than weight loss and fitness gain: Psychosocial dimensions among elder women in a primary-care exercise-referral program. *J Phys Act Health* 2001;**9**:313-28.

53. McAuley E, Lox C, Duncan TE. Long-term maintenance of exercise, self-efficacy, and physiological change in older adults. *J Gerontol* 1993;**48**:P218-24.

54. Marley J, Tully MA, Porter-Armstrong A, Bunting B, O'Hanlon J, Atkins L, *et al.* The effectiveness of interventions aimed at increasing physical activity in adults with persistent musculoskeletal pain: a systematic review and meta-analysis. *BMC Musculoskelet Disord* 2017;**18**:482.

55. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci* 2011;**6**:42.

56. Bandura A. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall; 1986.

57. Kerr J, Rosenberg DE, Nathan A, Millstein RA, Carlson JA, Crist K, *et al.* Applying the ecological model of behavior change to a physical activity trial in retirement communities: description of the study protocol. *Contemp Clin Trials* 2012;**33**:1180-8.

58. Foster CE, Brennan G, Matthews A, McAdam C, Fitzsimons C, Mutrie N. Recruiting participants to walking intervention studies: a systematic review. *Int J Behav Nutr Phys Act* 2011;**8**:137.

59. Ahmad S, Harris T, Limb E, Kerry S, Victor C, Ekelund U, *et al.* Evaluation of reliability and validity of the General Practice Physical Activity Questionnaire (GPPAQ) in 60-74 year old primary care patients. *BMC Fam Pract* 2015;**16**:113.

60. Adams R. Revised Physical Activity Readiness Questionnaire. *Can Fam Physician* 1999;**45**:992, 5, 1004-5.

61. McDonough SM, Tully MA, O'Connor SR, Boyd A, Kerr DP, O'Neill SM, *et al.* The Back 2 Activity Trial: education and advice versus education and advice plus a structured walking programme for chronic low back pain. *Bmc Musculoskeletal Disorders* 2010;**11**.

62. Heron N, Tully MA, McKinley MC, Cupples ME. Steps to a better Belfast: physical activity assessment and promotion in primary care. *Br J Sports Med* 2014;**48**:1558-63.

63. Migueles JH, Cadenas-Sanchez C, Ekelund U, Delisle Nystrom C, Mora-Gonzalez J, Lof M, *et al.* Accelerometer Data Collection and Processing Criteria to Assess Physical Activity and Other Outcomes: A Systematic Review and Practical Considerations. *Sports Med* 2017;**47**:1821-45.

64. Freedson PS, Melanson E, Sirard J. Calibration of the Computer Science and Applications, Inc. accelerometer. *Med Sci Sports Exerc* 1998;**30**:777-81.

65. Wareham NJ, Jakes RW, Rennie KL, Mitchell J, Hennings S, Day NE. Validity and repeatability of the EPIC-Norfolk Physical Activity Questionnaire. *Int J Epidemiol* 2002;**31**:168-74.

66. Goldberg DP, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O, *et al.* The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med* 1997;**27**:191-7.

67. Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychol Med* 1979;**9**:139-45.

68. Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, *et al.* The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health Qual Life Outcomes* 2007;**5**:63.

69. Lloyd K, Devine P. Psychometric properties of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) in Northern Ireland. *J Ment Health* 2012;**21**:257-63.

70. EuroQol G. EuroQol--a new facility for the measurement of health-related quality of life. *Health Policy* 1990;**16**:199-208.

71. Russell DW. UCLA Loneliness Scale (Version 3): reliability, validity, and factor structure. *J Pers Assess* 1996;**66**:20-40.

72. Lubben JE. Assessing social networks among elderly populations. *Family & Community Health: The Journal of Health Promotion & Maintenance* 1998;**11**:42-52.

73. Resnick B, Palmer MH, Jenkins LS, Spellbring AM. Path analysis of efficacy expectations and exercise behaviour in older adults. *J Adv Nurs* 2000;**31**:1309-15.

74. Steinhardt MA, Dishman RK. Reliability and validity of expected outcomes and barriers for habitual physical activity. *J Occup Med* 1989;**31**:536-46.

75. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, *et al.* Process evaluation of complex interventions: Medical Research Council guidance. *BMJ* 2015;**350**:h1258.

76. Hunter RF, Tully MA, Davis M, Stevenson M, Kee F. Physical activity loyalty cards for behavior change: a quasi-experimental study. *Am J Prev Med* 2013;**45**:56-63.

77. Winter S, Collins D. Why Do We Do, What We Do? *J Appl Sport Psychol* 2015;**27**:35-51.

78. Curtis LA, Burns A. *Unit Costs of Health and Social Care 2017*. Canterbury: University of Kent: Personal Social Services Research Unit; 2017.

79. Sumnall H, Agus A, Cole J, Doherty P, Foxcroft D, Harvey S, *et al.* Steps Towards Alcohol Misuse Prevention Programme (STAMPP): a school- and community-based cluster randomised controlled trial. *Public Health Research* 2017;**5**.

80. Lohan M, Aventin A, Maguire L, Curran R, McDowell C, Agus A, *et al.* Increasing boys' and girls' intentions to avoid teenage pregnancy: a cluster randomised controlled feasibility trial of an interactive video drama-based intervention in post-primary schools in Northern Ireland. *Public Health Research* 2017;**5**.

81. Hollingworth W, Cohen D, Hawkins J, Hughes RA, Moore LA, Holliday JC, *et al.* Reducing smoking in adolescents: cost-effectiveness results from the cluster randomized ASSIST (A Stop Smoking In Schools Trial). *Nicotine Tob Res* 2012;**14**:161-8.

82. Lee EC, Whitehead AL, Jacques RM, Julious SA. The statistical interpretation of pilot trials: should significance thresholds be reconsidered? *BMC Med Res Methodol* 2014;**14**:41.

83. Kang M, Marshall SJ, Barreira TV, Lee JO. Effect of pedometer-based physical activity interventions: a meta-analysis. *Res Q Exerc Sport* 2009;**80**:648-55.

84. Clegg A, Relton C, Young J, Witham M. Improving recruitment of older people to clinical trials: use of the cohort multiple randomised controlled trial design. *Age Ageing* 2015;**44**:547-50.

85. Rogers A, Harris T, Victor C, Woodcock A, Limb E, Kerry S, *et al.* Which older people decline participation in a primary care trial of physical activity and why: insights from a mixed methods approach. *BMC Geriatr* 2014;**14**:46.

86. Watson JM, Torgerson DJ. Increasing recruitment to randomised trials: a review of randomised controlled trials. *BMC Med Res Methodol* 2006;**6**:34.

87. Sahin D, Yaffe MJ, Sussman T, McCusker J. A mixed studies literature review of family physicians' participation in research. *Fam Med* 2014;**46**:503-14.

88. Salmon P, Peters S, Rogers A, Gask L, Clifford R, Iredale W, *et al.* Peering through the barriers in GPs' explanations for declining to participate in research: the role of professional autonomy and the economy of time. *Fam Pract* 2007;**24**:269-75.

89. Evenson KR, Buchner DM, Morland KB. Objective measurement of physical activity and sedentary behavior among US adults aged 60 years or older. *Prev Chronic Dis* 2012;**9**:E26.

90. Harris T, Kerry SM, Victor CR, Ekelund U, Woodcock A, Iliffe S, *et al.* A primary care nurse-delivered walking intervention in older adults: PACE (pedometer accelerometer consultation evaluation)-Lift cluster randomised controlled trial. *PLoS Med* 2015;**12**:e1001783.

91. Cleland CL, Tully MA, Kee F, Cupples ME. The effectiveness of physical activity interventions in socio-economically disadvantaged communities: A systematic review. *Prev Med* 2012;**54**:371-80.

92. Atkins L, Francis J, Islam R, O'Connor D, Patey A, Ivers N, *et al.* A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. *Implement Sci* 2017;**12**:77.

93. Knittle K, Nurmi J, Crutzen R, Hankonen N, Beattie M, Dombrowski SU. How can interventions increase motivation for physical activity? A systematic review and meta-analysis [published online ahead of print Feb 15 2018. *Health Psychol Rev* 2018.

Appendices

Appendix 1: Medline Search Strategy for Rapid review of Peer-Led Physical Activity Interventions

1	exp Exercise/
2	exp Running/
3	Walking/
4	Physical Fitness/
5	cardiovascular fitness.ti,ab.
6	Gardening/
7	exp "Physical Education and Training"/
8	Dancing/
9	exp Sports/
10	Fitness Centers/
11	exp Recreation/
12	exp "Play and Playthings"/
13	Motor Activity/
14	(fitness adj (class* or regime* or program*)).ti,ab.
15	cardiorespiratory fitness.ti,ab.
16	aerobic capacity.ti,ab.
17	((led or health) adj walk*).ti,ab.
18	(physical adj5 (fit* or train* or activ* or endur* or exer*)).ti,ab.
19	((moderate or vigorous*) adj activ*).ti,ab.
20	(exercise* adj5 (fit* or train* or activ* or endur* or aerobic)).ti,ab.
21	((leisure or fitness) adj5 (centre* or center* or facilit*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
22	((promot* or uptak* or encourag* or increas* or start* or adher* or sustain* or maintain*) adj5 gym*).ti,ab.
23	((promot* or uptak* or encourag* or increas* or start* or adher* or sustain* or

	maintain*) adj5 physical activ*).ti,ab.
24	((promot* or uptak* or encourag* or increas* or start* or adher* or sustain* or maintain*) adj5 (exer* or keep fit or fitness class or yoga or aerobic*)).ti,ab.
25	((decreas* or reduc* or discourage*) adj5 (sedentary or deskbound or "physical inactiv*")).ti,ab.
26	sport*3.mp. or walk*3.ti,ab. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
27	(run* or jog*).mp. or yoga.ti,ab. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
28	(work or workplace or commut* or travel* or equipment or facility or park* or friendly or infrastructure).ti,ab.
29	bicycle*.ti,ab.
30	bike*1.mp. or biking.ti,ab. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
31	swim*1.mp. or swimming*.ti,ab. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
32	(exercis*3 adj5 aerobic*).ti,ab.
33	exertion*1.ti,ab.
34	strength training.ti,ab.
35	resilience training.ti,ab.
36	travel mode*1.ti,ab.
37	(active adj (travel*4 or transport* or commut*)).ti,ab.
38	(multimodal transport* or alternative transport* or alternative travel*).ti,ab.
39	recreation*1.ti,ab.
40	("use" adj3 stair*).ti,ab.
41	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or

	33 or 34 or 35 or 36 or 37 or 38 or 39 or 40
42	peer group/
43	peer based intervention*.ti,ab.
44	peer led intervention*.ti,ab.
45	peer education.ti,ab.
46	peer*.ti,ab.
47	peer support*.ti,ab.
48	peer counsel?ing*.ti,ab.
49	(group adj support*).ti,ab.
50	(group adj education*).ti,ab.
51	((peer or opinion) adj leader*).ti,ab.
52	befriend*.ti,ab.
53	(home adj visit*).ti,ab.
54	(visit adj program*).ti,ab.
55	mentor*3.ti,ab.
56	Mentors/
57	(associate* or rival* or companion* or compeer* or like* or match* or coequal*).mp. or co-equal*.ti,ab. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
58	42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57
59	41 and 58
60	limit 59 to humans

Appendix 2: Template for extracting BCTs*

BCT Label	Excerpt	Page No & Paragraph
1. Goals and planning		
1.1. Goal setting (behaviour)		
1.2. Problem solving		
1.3. Goal setting (outcome)		
1.4. Action planning		
1.5. Review behaviour goal(s)		
1.6. Discrepancy between current behaviour and goal		
1.7. Review outcome goal(s)		
1.8. Behavioural contract		
1.9. Commitment		
2. Feedback and monitoring		
2.1. Monitoring of behaviour by others without feedback		
2.2. Feedback on behaviour		
2.3. Self-monitoring of behaviour		
2.4. Self-monitoring of outcome(s) of behaviour		
2.5. Monitoring of outcome(s) of behaviour without feedback		
2.6. Biofeedback		
2.7. Feedback on outcome(s) of behaviour		
3. Social support		
3.1. Social support (unspecified)		
3.2. Social support (practical)		
3.3. Social support (emotional)		
4. Shaping knowledge		

4.1. Instruction on how to perform the behaviour		
4.2. Information about antecedents		
4.3. Re-attribution		
4.4. Behavioural experiments		
5. Natural consequences		
5.1. Information about health consequences		
5.2. Salience of consequences		
5.3. Information about social and environmental consequences		
5.4. Monitoring of emotional consequences		
5.5. Anticipated regret		
5.6. Information about emotional consequences		
6. Comparison of behaviour		
6.1. Demonstration of the behaviour		
6.2. Social comparison		
6.3. Information about others' approval		
7. Associations		
7.1. Prompts/cues		
7.2. Cue signalling reward		
7.3. Reduce prompts/cues		
7.4. Remove access to the reward		
7.5. Remove aversive stimulus		
7.6. Satiation		
7.7. Exposure		
7.8. Associative learning		
8. Repetition and substitution		
8.1. Behavioural practice/rehearsal		
8.2. Behaviour substitution		
8.3. Habit formation		

8.4. Habit reversal		
8.5. Overcorrection		
8.6. Generalisation of target behaviour		
8.7. Graded tasks		
9. Comparison of outcomes		
9.1. Credible source		
9.2. Pros and cons		
9.3. Comparative imagining of future outcomes		
10. Reward and threat		
10.1. Material incentive (behaviour)		
10.2. Material reward (behaviour)		
10.3. Non-specific reward		
10.4. Social reward		
10.5. Social incentive		
10.6. Non-specific incentive		
10.7. Self-incentive		
10.8. Incentive (outcome)		
10.9. Self-reward		
10.10. Reward (outcome)		
10.11. Future punishment		
11. Regulation		
11.1. Pharmacological support		
11.2. Reduce negative emotions		
11.3. Conserving mental resources		
11.4. Paradoxical instructions		
12. Antecedents		
12.1. Restructuring the physical environment		
12.2. Restructuring the social environment		

12.3. Avoidance/reducing exposure to cues for the behaviour		
12.4. Distraction		
12.5. Adding objects to the environment		
12.6. Body changes		
13. Identity		
13.1. Identification of self as role model		
13.2. Framing/reframing		
13.3. Incompatible beliefs		
13.4. Valued self-identify		
13.5. Identity associated with changed behaviour		
14. Scheduled consequences		
14.1. Behaviour cost		
14.2. Punishment		
14.3. Remove reward		
14.4. Reward approximation		
14.5. Rewarding completion		
14.6. Situation-specific reward		
14.7. Reward incompatible behaviour		
14.8. Reward alternative behaviour		
14.9. Reduce reward frequency		
14.10. Remove punishment		
15. Self-belief		
15.1. Verbal persuasion about capability		
15.2. Mental rehearsal of successful performance		
15.3. Focus on past success		
15.4. Self-talk		
16. Covert learning		

16.1. Imaginary punishment		
16.2. Imaginary reward		
16.3. Vicarious consequences		

*Adapted and reproduced with permission from Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W, *et al.* The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann Behav Med* 2013;**46**:81-95.

Appendix 3: Example of the fidelity checklist completed by the peer mentor following the completion of weekly meeting with participant

Week 1

Introductory meeting	**Completed (tick/comment)**
What is the role of a peer mentor? • Discuss the peer mentor's commitment and main tasks (P.9)	
Physical activity – how much is enough? • Discuss the Chief Medical Officers Physical Activity Guidelines (P.13)	
Promoting physical activity • Discuss the main components of the Walk with Me programme	
Goal-setting and self-monitoring • Discuss goal setting with the use of a pedometer and a step diary	
• Distribute pedometers and demonstrate wear and function	

• Complete a 20-step pedometer test • Pedometers are to be worn for the next 7 days – daily step totals are to be recorded in the weekly step diary	
• Exchange contact details and arrange a meeting time/venue for next week	

Walk with Me

Weekly Step Diary

Name:

Daily Step Goal:	

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average steps per day
Steps								
Comment								

Number of days met goal:	
Number of days failed to meet goal:	
Goal for next week	

Appendix 4: Health Service Use Log

Thank you for agreeing to take part in the Walk with Me study. As part of this study we would like to find out some information about your use of health services. For example we would like to know how many times you had an appointment with your GP or how many times you have attended an outpatient appointment.

The information you give us will be confidential and will only be used for the Walk with Me study. Your answers will not affect the health care you are receiving now or any health care you might receive in the future.

Please record your use of health services from the log start date stated at the top of each page, until we contact you again in 6 months. The services are separated out under

1. Contacts with a Doctor or Nurse from your GP practice / surgery
2. Appointment you have had with other health care professionals
3. Use of Hospital Services or Residential Service

If you require additional space or you are not sure where to add something, please use Section 5 titled "Additional Information" at the end of the log.

If you have any questions about this log and how to fill it in, then please contact the trial manager

1. Contacts with a Doctor or Nurse from your GP practice / surgery

In this section please tick a box each time you see or speak with a doctor or nurse from your GP practice / surgery and record the date in the relevant box – this is to help you keep track of your contacts.

1.1 Appointments with the doctor at the GP practice / surgery						
Appointment number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Appointment number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Appointment number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

1.2 Spoke with the doctor on the telephone						
Call number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Call number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Call number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

1.3 Visits from the doctor at your home						
Visit number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Visit number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Visit number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐

Date						

1.4 Phone calls to the GP Out-of-Hours service (not leading to a visit)						
Call number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Call number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Call number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

1.5 Visits to the GP Out-of-Hours service.						
Visit number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Visit number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Visit number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

1.6 Appointments with the nurse at the GP practice						
Visit number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Visit number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Visit number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

1.7 Spoke with the nurse on the telephone						
Call number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Call number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Call number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐

Date						

2. Contacts with other health care professionals

2.1 Visits from a community / district nurse at your home						
Visit number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Visit number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Visit number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

2.2 Visits from a social worker at your home						
Visit number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Visit number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Visit number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

2.3 Appointment with a health service physiotherapist						
Appointment number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Appointment number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						
Appointment number	**13** ☐	**14** ☐	**15** ☐	**16** ☐	**17** ☐	**18** ☐
Date						

2.4 Appointment with a health service podiatrist /chiropodist						
Appointment number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐

Date						
Appointment number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						

3.4 Appointments with an occupational therapist						
Appointment number	**01** ☐	**02** ☐	**03** ☐	**04** ☐	**05** ☐	**06** ☐
Date						
Appointment number	**07** ☐	**08** ☐	**09** ☐	**10** ☐	**11** ☐	**12** ☐
Date						

Please use the sections below to record any visits you receive by other health care professionals which we have not listed, and state their job title. Please include visits with health care professionals you may have paid for privately e.g. private physiotherapist.

3.4 Other health care professional (please state job title): _____						
Visit number	01 ☐	02 ☐	03 ☐	04 ☐	05 ☐	06 ☐
Date						
Visit number	07 ☐	08 ☐	09 ☐	10 ☐	11 ☐	12 ☐
Date						

3.5 Other health care professional (please state): _____						
Visit number	01 ☐	02 ☐	03 ☐	04 ☐	05 ☐	06 ☐
Date						
Visit number	07 ☐	08 ☐	09 ☐	10 ☐	11 ☐	12 ☐
Date						

4. Use of Hospital Services or Residential Services

4.1 Visits to Accident and Emergency						
Visit number	01 ☐	02 ☐	03 ☐	04 ☐	05 ☐	06 ☐
Date						
Visit number	07 ☐	08 ☐	09 ☐	10 ☐	11 ☐	12 ☐
Date						

Please record in the box below if you visit / attend any of the following

- Hospital clinic
- Outpatient department
- Day hospital
- Day procedure unit

4.2 Visits to hospital clinic or outpatient department		
Visit number	**Date**	**Name of clinic / department / unit**
01 ☐		
02 ☐		
03 ☐		
04 ☐		
05 ☐		
06 ☐		
07 ☐		
08 ☐		
09 ☐		
10 ☐		
11 ☐		
12 ☐		

Please record in the boxes below if you are admitted as an inpatient to hospital. Please provide the name of the hospital unit and enter each admission separately.

4.3 Hospital admissions				
Admission	**Name of hospital unit**	**Date of admission**	**Date of discharge**	**Reason for admission**
01 ☐				
02 ☐				
03 ☐				
04 ☐				
05 ☐				
06 ☐				
07 ☐				
08 ☐				
09 ☐				
10 ☐				
11 ☐				
12 ☐				

5. Additional Information

If you run out of space in any of the section or you are not sure where to record something, use this space below.

6. Your feedback at the end of the 6 months

Finally, we would like you to tell us what you thought of using this log. For each of the statements below please indicate how strongly you agree / disagree with it by placing a tick in the appropriate box.

	strongly disagree	**disagree**	**neither agree nor disagree**	**agree**	**strongly agree**
I was willing to complete the log					
It was easy to use the log					
It was easy to remember to use the log					
The log was burdensome					

Do you have any other comments or suggestions on how may improve this log?